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ABSTRACT

Evaluation methods and results are reported for the "Man In His Environment" (MIHE) exhibition at Field Museum in Chicago, Illinois. The evaluative design included an analysis of both knowledge and attitudes as they relate to the content and objectives of the exhibit. Museum visitors who agreed to participate were tested by questionnaires before and after experiencing the exhibit. Also, behavior of 75 randomly selected visitors was recorded as they proceeded through the exhibit area. Findings of this study include the following: (1) attraction to the exhibit was highest among highly educated, white, young adults; (2) this audience tended to have most of the attitudes and knowledge the exhibit was designed to impart; (3) the exhibit was most effective in terms of gain in knowledge with the group that completed high school; (4) behavior of visitors varied, with certain displays (films, sculpture) holding a higher percentage of visitors; (5) one-third of the visitors left before "seeing" all of it; (6) films were rated as most liked; (7) one-fourth of posttested participants indicated willingness to do one or more specific things to improve the environment; and (8) 80% considered the exhibit experience as a positive one. (CS)

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AN EVALUATION OF VISITOR RESPONSE TO "MAN IN HIS ENVIRONMENT"

Final Report

Prepared for the Field Museum of Natural History
Chicago, Illinois 60605

by

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July 1976

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Dr. Alice Carnes, Chairperson
Department of Education

Mr. Paul Hummer, Project Manager
Man In His Environment exhibit
(left Field Museum November, 1975)

Dr. Robert F. Inger, Assistant Director
Science and Education

The conduct of the actual data collection phase of the study was under the direct "floor" supervision of Ms. Nancy Simpson. She was aided in this effort by Mr. Scott Lancelot. The smoothness with which some 500 visitors were approached, and 300 of them tested, is a credit to both of these capable people, along with a hard-working group of students from the University of Illinois (Chicago Circle).

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Harris H. Shettel

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ABSTRACT

A comprehensive evaluation was undertaken of The Man In His Environment (MIHE) exhibition, a large and permanent display designed to impart to a broad cross-section of the population (high school-educated and above) the following major points:

1. That, as a result of the limited resources of the earth, nature has evolved systems to keep populations of organisms under control.
2. That man is not a bystander to these systems but is an active participant in them.
3. That man, who has much in common with other life-forms, has the additional capacity to modify natural systems.
4. That man's decision to modify natural systems is an ethical decision, since any choice he makes affects himself and every other living thing.

The exhibit consists of a combination of four static displays and two continuous loop films shown in small theaters, one on natural systems and how they work, and one on man's disruption of those systems and alternatives available to him to eliminate or minimize such disruptions.

The evaluative design called for an analysis of both knowledge and attitudes as they relate to the content and objectives of the exhibit. To make it possible to ascribe attitude change and learning to the exhibit experience itself, visitors who agreed to participate were tested both before and after "seeing" the exhibit. (However, the posttest group was not the same as the pretest group.) The pretest consisted of a 17-item questionnaire given to approximately 150 persons 16 years and older, selected randomly; the posttest consisted of the same questionnaire plus a 10-question oral interview in which specific exhibit knowledge, attitudes, likes and dislikes could be addressed, as well as determining whether any personal commitment to change was made as a result of the

exhibit experience. The number of visitors in the posttest group was comparable to the pretest group. Information on age, sex, education, residence, etc., was obtained from all participants.

In addition to these test procedures, another major part of the study consisted of the observation of the behavior of 75 randomly selected visitors as they proceeded through the exhibit area. A detailed record of where they stopped, how long they stopped and what they did while stopping (talk, read, point, etc.) was unobtrusively obtained.

The salient findings of the study are as follows:

- At the time the data were collected (Dec. 16, 1975 through Jan. 9, 1976), the exhibit tended to attract a highly educated, white, young-adult/adult, mixed male and female audience, mostly from suburban Chicago or out-of-town.
- On the basis of the test results, this audience tended to have most of the attitudes and many of the specific knowledges that the exhibit is designed to impart.
- College trained visitors had higher levels of knowledge before seeing the exhibit than "High School" and "Some High School" groups had after seeing the exhibit. Neither sex nor age were related to test results.
- The exhibit was most effective in terms of gain in knowledge with the group that completed high school. This is due, in large part, to the fact that this group started at a lower level of knowledge and had more "room for improvement."
- Behavior within the exhibit varied considerably. Certain displays attracted and held a high percentage of visitors (e.g., films, sculpture), and others a very low percentage (e.g., sulphur cycle, concluding area).
- Misconceptions of the intended messages in one section of the exhibit, "Man, the Toolmaker," were very common.
- One-third of those entering the exhibit left before "seeing" all of it (using the entrance as the exit). Most of these "dropouts" occurred after seeing the first film.
- Visitors who completed the entire exhibit rated the two films as the things they liked most, with the marsh very close in these ratings.

- One-fourth of the participants in the post-study said that they are going to do one or more specific things in terms of pollution, recycling, waste, etc., as a result of seeing the exhibit. Nineteen percent are already "doing something." The rest (54%) do not plan to make any changes in their "way of life."

- One-fifth of the visitors who saw all of the display areas did not recall seeing the Paton quote. Of those who saw it, 66% could give an adequate interpretation of it; 34% could not.

- Eighty percent of the participants considered the exhibit experience to be a positive, or very positive, one.

- Eighty percent of the posttest participants could state the essence of the basic message of the exhibition.

Introduction

The notion that exhibits should "communicate," or "tell a story," or "have a message," or "instruct," or "have educational value," is generally well accepted in principle. Few today would deny that so-called "interpretive exhibits" have a role to play in (at least) those museums devoted to the natural and physical sciences and their associated technologies. In fact, over 90% of all museum directors agreed in a survey conducted in 1974 that a critical role of museums is "informing and instructing the public."*

However, the implications flowing from such an instructional/educational commitment have not been realized, nor, in fact, have they even been seriously considered by the majority of the museum profession. Exhibits, which, after all, are the principal points of contact between the museum and the "public," are conceived, planned, designed, executed and "evaluated" without the assistance of those who have expertise in training, educational and social psychology, or evaluation!

The present study of a major environmental exhibition, which is now part of your permanent display, represents a dramatic exception to the above generalized observation. Not only was a fairly comprehensive summative evaluation of the Man In His Environment (MIHE) exhibition carried out, but the author was involved in a consultative capacity in some of the early thinking and planning connected with the exhibition. In addition, two formative evaluations were conducted by the author on critical elements of the exhibit before they were cast in their final configuration.

*"Providing educational experiences for the public was considered a very important purpose by the largest percentage of museum directors (92%)." Museums, USA, National Endowment for the Arts, 1974, p.25.

The correct balance between curators, designers, educators, psychologists and evaluators has not been arrived at within the museum environment, but the work reported on here represents one step toward defining a productive and workable "mix." At the very least, this technical report will, hopefully, provide evidence that the role of the psychologist/evaluator in the museum setting is a constructive one, not a destructive one. The findings are, in part, critical. Furthermore, some of the negative findings could very probably have been avoided had more attention been given to the "educational subsystem" during the planning, design and execution phases of exhibit work. But the value of new knowledge is largely in the hands of the user, and this applies to "negative" knowledge as well as "positive" knowledge. Your commitment to use the findings of this study to help in making decisions about the kinds of modifications to be made in MIHE is clearly a positive and constructive approach to the evaluative function in the museum setting.

Furthermore, such studies as this begin to provide the kind of information and evidence that can contribute to the broader arena of a true technology of exhibit effectiveness, one that is generalizable to all exhibits that have a didactic function. As principles emerge, are tested and refined (or discarded), a body of knowledge can be generated that has predictive power, i.e., that can say with some defined degree of certainty that if you are trying to convey "this" idea to "that" audience by means of "these" objects and devices, you ought to go about it in "these" specific ways. Only by such an accumulation of validated knowledge can exhibits cease to be ad hoc creations, and evaluative efforts ad hoc "fixes."

A Description of the Man In His Environment Exhibition

For those who may read this evaluative report without having had the opportunity of actually seeing the exhibit, the following brief description is provided.

The exhibit is in a completely enclosed area, with the entrance and exit being at opposite ends of a long, rectangular space (approximately 125' x 40'). Once you enter, you are led by a series of corridors, and in a linear flow, to each of the six major sub-areas of the exhibit.

The first three areas tell the story of nature and how it "works." The diversity of nature is shown in the initial display area by means of a few representative samples of flora and fauna from six of the biomes that make up our biosphere, supplemented by large and dramatic color photographs. The visitor then proceeds to a small theater showing a continuous loop film that covers, in a basic but dramatic way, using the real world as its stage, the three critical natural processes that sustain all life: how the sun's energy is used and transmitted (and partly lost) as it passes through the food chain; how mineral nutrients are cycled and recycled through both living and dead matter; and how animal populations are kept in balance with each other as a result of natural checks such as predators, food supply, weather, disease and their own evolved, adaptive behavior patterns. After seeing the film, the visitor is led to a three-dimensional habitat group, simulating a salt water marsh. Here the concepts and principles discussed in the film can be applied to the birds, fish, animals and insects that are so convincingly reproduced in a large, square, glassed-in case. Around this case is a "reading rail," where questions are asked relating to the various natural processes, encouraging the visitor to use the marsh to find the answers (which are also provided so that one can see how well he did).

Leaving the marsh, the visitor is introduced to the role of man in nature by a dramatic and life-sized sculpture, showing an early man and a lion cutting the flesh of a pig--but the man is using a stone tool! The tool theme is continued in a room containing three sequentially displayed artifacts used to obtain food--a flint chopper, a wooden medieval swingplow, and a modern and complex steel plow. A large end panel shows, in a series of photos, the resources--human, mineral and energy--needed to produce the modern plow, and a quote on the opposite wall raises the question of who is the master--the tool or man!

A second continuous loop film called "The Choice is Ours" continues the theme of man and his relationship to nature and her laws. Here, the visitor is dramatically and forcefully shown the three major issues of our time: population expansion and the over-consumption of natural resources; the control of poisonous substances that enter our air and water (and bodies); and

our traditional social institutions and their inability to adapt to the pressing need for basic changes in our way of life. The film combines the grave dangers facing man with the hope of alternatives. There are alternatives but they are difficult to accept. Can we and our institutions reshape our lives and our social systems so that we will be in balance with nature? The film suggests that we can, but that time is short and the task a very large and difficult one.

The final area of the exhibit is called "Message From Other Cultures" and indicates, by means of three objects and label copy, that other, more "primitive," cultures have managed to live in balance with their environment--and leaves the visitor to contemplate on how successfully we will learn to do the same, and perhaps what role each of us might personally play in this effort.

In many places throughout the exhibit area is reproduced the now famous quote from Cry, The Beloved Country by Alan Paton:

> Keep it,
> guard it,
> care for it,
> for it keeps men,
> guards men,
> cares for men.
> Destroy it
> and man is destroyed.

Study Design

The evaluative study was divided into two sub-studies. One was designed to obtain a variety of information directly from visitors, in the form of interviews and questionnaires. Knowledge gain and attitude change produced by, and consistent with, the goals and objectives of the exhibit, were the primary targets of this phase of the study.

The second sub-study was designed to obtain observational data from visitors as they went through the exhibit. Where they went, what they did, and how long they took doing it, were the essential elements of this part

of the effort. Demographic data were also obtained from all participants in the study.

The parameters of the study were "fixed" to some extent by both budget and "real world" considerations, a situation not at all atypical of field research in general. A museum visitor is not a rat in a maze. His or her life space can be violated only to a limited extent by the needs of the evaluator. They did not come to the museum to be tested and interviewed. Fortunately, most visitors are willing to make a small investment of 10 or 15 minutes in the cause of "science," and will usually agree to participate.

The plan for the information/attitude phase of the study called for a pre- post-design, "using" one set of visitors for the pretest and a different set for the posttest. Following a random selection procedure, the goal was to obtain the participation of 150 pre- and 150 post-visitors. In actuality, interviews were conducted and questionnaires completed on 158 pre- and 157 post-visitors. (A very small rate of attrition occurred as a result of incomplete or unusable forms, but in only one category was the total less than 150, and that total was 149.)

As was planned, observation data were obtained on 75 visitors, again selected randomly. One observational data form was uninterpretable, so that, for some analyses, the total number of observations is equal to 74.

Demographic Data

Table 1 shows the way in which the pre, post, and refusal groups of visitors broke down by the various demographic categories on which information was obtained. Pre and post visitors were asked to indicate their age, education, etc. Those who refused to participate were not asked these questions, but estimates of their ages were made. (Sex was determined visually, and should be fairly accurate!)

As would be expected on the basis of the random selection procedure used, not all demographic categories are equally represented. However, the "mix" obtained should be an accurate representation of at least the MIHE

Table 1

Demographic Data, Pre- and Posttest Sample

	Pretest Participants		Posttest Participants		Pretest Refusals		Posttest Refusals	
	N	%	N	%	N	%	N	%
AGE								
16-20	19	12	21	13	2	3	7	6
20-29	66	42	62	40	22	36	58	48
30-39	33	21	43	27	25	41	38	32
40-49	22	14	14	9				
50+	18	11	17	11	12	20	17	14
Total	158	100	157	100	61	100	120	100
SEX								
Male	82	52	87	55	18	30	48	40
Female	76	48	70	45	43	70	72	60
Total	158	100	157	100	61	100	120	100
RACE								
Black	7	5	6	4				
White	149	94	150	95.5				
Spanish	0	0	1	.5				
Other	2	1	0	0				
Total	158	100	157	100				
LOCATION								
Chicago	34	22	44	28				
Suburban	46	29	38	24				
Other	78	49	75	48				
Total	158	100	157	100				
EDUCATION								
Elementary	1	.6	0	0				
Some High School	7	4.4	12	7.6				
Completed H.S.	17	10.7	21	13.3				
Some College	55	34.8	37	23.5				
BA	37	23.4	55	35				
MA	28	17.7	23	14.6				
Ph.D.	13	8.2	9	5.7				
Total	158	100	157	100				

84% 79%

visitors from age 16 and above (16 being the lower limit of the desired sample), and, possibly, of the general Field Museum visitors as well.

This raises an important question about the generalizability of these data, which would depend on the extent to which MIHE visitors came specifically to see that exhibit who would not otherwise have visited the museum. Based on the answers to the question "Why did you come to this exhibit?", only a very small percentage indicated that they came specifically to see MIHE. Most "just happened to see it" or "saw the signs in the entrance area." This is not to say that there is not a differential attraction exerted by different exhibits once the visitor enters the building. The surprisingly high educational level of the MIHE visitor suggests that some such factor may well be operating. However, in the absence of a longitudinal survey of the museum visitor in general, one can only speculate on the relationship between the MIHE visitor and the Field Museum visitor. The time the study was conducted may also play a role in determining the "mix" of people obtained. The Christmas/New Year period during which the study was conducted may not be typical of other seasons of the year. Available information on monthly attendance is not divided into the same categories used in this study, and is thus of no value in making such comparisons.

Table 2 presents the "refusal" data and provides a brief interpretation of the results. It should be noted that while the refusal rate was fairly high, especially (and understandably) for the posttest group, there were no incidents or displays of anger of any kind. Ninety-seven percent of those who refused gave "time" or "with children/group" as the problem. (Interviewers were trained to be very permissive and to accept "no" gracefully and without attempting to pressure or "sell" people on participating.) The higher refusal rate for women is believed to be due to the fact that they were more likely to be with children or with groups. (Of the 11 "singles" in the observation study, only two were female.)

The "picture" presented by Tables 1 and 2 of (at least) the typical MIHE visitor is quite clear. The person is a young adult, 20 to 39 years of age; is white; is in, or has been to, college; is somewhat more likely to be female; and is much more likely to be from suburban Chicago or out-of-town than from Chicago proper. Perhaps the most dramatic finding has to do with the educational level of the typical MIHE visitor. Eighty-four percent of the pretest group and 79% of the posttest group had at least some college experience. Fifty-two percent of both groups combined had college degrees, 7% of them Ph.D.s!

The above information on the MIHE visitor is of particular interest when considered in the context of the "target audience" that the museum in general, and MIHE in particular, has defined for itself. The MIHE message was intended to be "delivered" to a wide and representative audience of the

Table 2
Refusal Data and Interpretation

Total number of visitors approached and tested by sex:

		Approached		Tested	
		M	F	M	F
Pretest	N	100	119	82	76
	%	45%	55%	52%	48%
Posttest	N	134	143	86	71
	%	48%	52%	55%	45%

Total females approached = 262
Total males approached = 234
TOTAL 496

Pretest refusal rate = 28%
Posttest refusal rate = 43%
Average rate = 36%

Male refusal rate = 28%
Female refusal rate = 44%

More females than males attended exhibit (based on approach data--262 vs. 234) but more males tested because of higher female refusal rate.

Chicago area, high school-educated and above, but particularly to those who are most likely to "need" it (i.e., those who are responsible for consuming most of the energy and mineral resources--middle and upper income suburban families--and those who are least likely to know about, or believe in, the message--lower income, inner city families). Based on the data shown above, and the knowledge/attitude results reported on below, the reader can judge whether or not the intended target audiences are being reached, and to the extent they are, whether or not MIHE is having its intended impact on them.*

Study Instruments and Forms

The nature of the study can best be seen by reviewing the various forms used. A complete set is contained in Appendix A. A brief comment on each follows.

Posttest visitors could be asked to comment on the exhibit itself, while pretest visitors, of course, could not. To avoid problems connected with the variability in writing skills among different educational groups, those posttest materials dealing with reactions to, and feelings about, the exhibit per se were covered by means of a structured oral interview. The interview items are shown in A-1. Since the total time for completing all materials was not to exceed 10 or 15 minutes, the items were chosen to represent only those considered most useful and critical to the study. Interviewers wrote the answers down on the form shown in A-2 and A-3.

*A quote from Museums USA: A Survey Report (1974), is appropriate in this context: "Museum attendance is one element in determining how well museums are meeting their obligations to the public, but there is little hard data available on actual attendance levels. The implication of this lack of accurate data . . . is serious. Accurate data, both in terms of attendance size and composition, can provide the basis on which better, more effective exhibitions and programs can be designed. *One might assume that far too often exhibitions are designed with an audience in mind which may bear only a marginal relationship to the museum's actual audience.*" (p. 127) Italics added.

They were trained to write the visitors' opening remarks to each item in fairly complete form and to "capture the essence" of their overall answers. They all appeared to do an excellent job of getting the essential information recorded accurately. The scoring form used to score the results of the posttest oral interviews is shown in A-4.

Both the pre- and posttest visitors were given the questionnaire shown in B-1 through B-4. All comparisons made between the pre- and post-groups were made on the basis of the results of the analysis of this questionnaire. It is designed to cover both attitude and informational items, all drawn from an examination of the objectives of MIHE as previously defined by Field Museum personnel.

The first page of the questionnaire contains a semantic differential item designed to measure attitudes toward nature. The remaining pages of the questionnaire contain items related to various specific areas and goals of the exhibit. That is, items 7, 8, 9, 11, and 12 are related to the first theater and the Marsh, and items 1, 4, 5, 10, 13 and 14 to the second theater and the Toolmaker area. Items 2, 15, and 16 are related to the second film, but in the context of a commitment to "being involved" and the notion that a change in one's own lifestyle is appropriate and/or necessary. Items 3 and 6 deal with the broader issues of the need for social change.

Item C-1 and C-2 in Appendix A is the form on which was recorded the various visitor demographic information and other data pertinent to the study. Similarly, Item D is the form on which such information was recorded for those visitors whose behavior was being observed. (Almost no one appeared to know that they were being "followed" through the exhibit. The two or three who did seem to notice it were not visibly disturbed.)

Item E is the form that was completed for all those who were approached for participation in the study but who declined to do so.

Item F is the general instruction sheet for interviewers. All interviewers were college people, most with course work in psychology and measurement. They were trained by the author over a period of two days and directed in their day-to-day work by two senior people, at least one of whom was with them at all times. All forms were checked upon completion and missing data, and/or ambiguities were cleared up or the form discarded. Interviews were conducted and observational data obtained on both weekdays and weekends over a period of three weeks in late December 1975 and early January 1976.

The remaining portion of Appendix A consists of the forms used to collect the visitor observational data. Three items of information were obtained at each sub-area of the exhibit stopped at by the observee, (1) the order of the stop (1st, 2nd, 3rd, etc.), (2) what was done at the stop (e.g., read, look, point, etc.), and the amount of time spent at that particular location. Summary times for each area were also recorded, as well as the overall time in the exhibit. (The numbers written in on these forms at each location are for identification purposes and will be used later in this report when the results of the observation study are discussed.)

Results

Results from the information/attitude phase of the study will be reported on first, followed by those obtained from the observational study.

Pre/Post Questionnaire Results

Both the semantic differential and the questionnaire items provide the opportunity to look at differences between those visitors who had not seen the exhibit and those who had seen it. Each of the items on these forms was given a numerical value that corresponds to the various choices provided for the item (i.e., *Strongly Agree, Agree, Disagree, Strongly Disagree* on the questionnaire, and the five intervals provided on the semantic differential form). The value given is related to the appropriateness or correctness of the answer. Thus, on the semantic differential,

those who thought of nature as being "Valuable" were given a higher score than those who thought of nature as "Not Valuable," (see Appendix, B-1). Similarly, those who "Strongly Agree" that "We can continue for many years to come to use the earth's resources the way we have without running into a serious problem" (Item 1, B-2), would be given a lower score than those who "Disagree" or "Strongly Disagree."

For statistical purposes it is assumed that the values given to the four adjacent answer categories are of equal distance from each other (referred to as interval data). Thus, the psychological distance between "Agree" and "Strongly Agree" is assumed to be the same as the distance between "Disagree" or "Strongly Disagree." Based on this assumption, parametric statistics can be used on these data.*

All pre- and post-questionnaire items were scored, and a total score computed for each participant. These total scores were then examined to determine which of the various, possible demographic variables would provide the most meaningful way of looking at the data. For example, age grouping might be sensitive to variations in the scores, or possibly sex differences. There were, in fact, "sex" differences and there were "age" differences when these variables were looked at alone. However, when looked at along with education, these differences disappeared. Educational differences remained stable, regardless of the manipulation of sex and age variables. Therefore, all analyses of pre/post data were subdivided only in terms of educational level.

*One may argue that the categories of possible answers are more ordinal (1st, 2nd, 3rd, 4th) than interval. They are probably between the two, that is, interval within either of the two agree and disagrees answers, and ordinal between the agree and disagree answers. However, it has been shown that the researcher is usually on safe grounds when he applies parametric tests to ordinal or interval data. (Educational Statistics, W. James Popham, 1967, p. 273.)

The most fundamental question relating to the study is, "Do those who visit the exhibit experience a significant change in their knowledge of, and/or attitudes toward, the environment and man's role in that environment, such change being consistent with the goals and objectives as defined by those responsible for the exhibit?" This question can be most directly and generally answered by looking at overall pretest scores in comparison with overall posttest scores. This is done in Table 3. First, it should be noted that the table is designed to show pre and post scores by educational group and by type of test. A test of the statistical significance of each of the differences between pre and post scores was carried out (using a one-tailed t test). This analysis revealed only one comparison that is significant at $> .05$--the actual p value is .02. Such a confidence level indicates that in only two times out of 100 would a finding of this magnitude be obtained by chance from the same two comparisons.*

The group for which this finding was obtained is the "completed high school" sample for the multiple choice items, showing an increase on these items from a mean score of 7.6 to a mean score of 10.8 (maximum score=25).

This is an encouraging finding, since it suggests that the exhibit is capable of making a small but significant (statistically) difference in this relatively uninformed group. This was not the case, however, with an even less informed group, the "some high school" sample. They started lower than the high school group (6.4 vs. 7.6) but failed to show any improvement--in fact their average posttest score is lower by 1.8 points. (The very small sample for the "some high school" group makes it difficult to draw meaningful conclusions. In any case, one cannot prove the null hypothesis, only reject it. This caveat applies to the other small sample groups, e.g., the Ph.D. sample.)

*Traditional usage has established .05 as the upper p value in order for a difference to be significant, and on the basis of which the null hypothesis can be rejected.

Table 3

Pre- and Posttest Summary Scores by Education

Educational Level		Semantic Differential*	Multiple Choice Items**
Ph.D.	Pre	8.1 (N=13)	14.8 (N=11)
	Post	9.6 (N= 9)	15.0 (N= 9)
MA	Pre	10.1 (N=27)	14.3 (N=25)
	Post	10.2 (N=23)	16.1 (N=23)
BA	Pre	10.4 (N=36)	13.4 (N=37)
	Post	10.0 (N=55)	15.0 (N=55)
Some College	Pre	9.6 (N=54)	12.7 (N=52)
	Post	10.3 (N=37)	13.7 (N=35)
Completed High School	Pre	9.4 (N=16)	7.6 (N=17)
	Post	8.2 (N=18)	10.8 (N=18)***
Some High School	Pre	8.5 (N= 6)	6.4 (N= 7)
	Post	8.3 (N=12)	4.6 (N=12)
Average	Pre	9.4 (N=152)	11.5 (N=149)
	Post	9.5 (N=154)	12.5 (N=152)

*Maximum score=14
**Maximum score=25
***Difference significant at .02 level

Other interesting characteristics of the findings shown in Table 3 are the gradually increasing scores as the educational level increases on the multiple choice items. This is also true on the semantic differential test up through the BA level. It is worth noting that of the 12 comparisons made between pre and post, 8 of them are in a positive direction, and only 4 in a negative direction, 3 of the latter being in the semantic differential test.

Finally, the very small pre-and post-difference in the overall averages for the two tests should be noted. On the basis of these close and non-significant average scores, one would have to say that, selected randomly from age 16 and above, the safest prediction to make would be that there would be no real change in either attitude or knowledge as a result of seeing the entire exhibit.* Contrariwise, if one wanted to pick a group that would show significant change, one would pick those who had completed high school but had no college education. Unfortunately, the latter group does not appear to be attracted to the exhibit in very large numbers, accounting, as they do, for only 12% of the total of all participants in the study. (Useful comparison figures would be the percentage of high school graduates in the city of Chicago proper and in the metropolitan area.)

To provide a more detailed and diagnostic look at pre/post performance on the multiple choice items on the questionnaire, a different approach was taken to the data. For this purpose, the percentage of individuals who answered an item in accordance with the objectives of the exhibit were computed. To avoid complications of distinguishing between an "Agree" answer and a "Strongly Agree" answer, these two categories were aggregated. That is, if the best answer was "Strongly Agree," and 20% of the visitors gave that answer, but 10% also said "Agree," it was computed as "30% correct." Naturally, the same technique was used for "Disagree" and "Strongly Disagree." This provides a somewhat less precise measure of performance than that obtained by using differential weights for each response (as done in Table 3), but gives the "benefit of the doubt" to those who at least answered in the right direction. Furthermore, each item was looked at separately, so that one could say what percentage of pre- and post-visitors answered a specific item correctly. Finally, for this analysis, items were grouped together according to their relationship to the content of the various areas of the exhibit, and to the overall objectives of the exhibit.

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*The final qualification is not trivial--36% of those who entered the exhibit did not "see it all" and exited through the entrance, based on the 75 visitors studied in the observation phase of work. All those who took the posttest did at least walk through the entire exhibit.

Table 4 presents these data. A good deal of information can be obtained from this table. (A copy of the items themselves would be helpful in interpreting these findings--see Appendix A, A-6 through A-8.) To help the reader, several "cells" will be discussed in detail.

The upper left entry shows that 100% of those visitors with a Ph.D. got the correct answers on item 7 prior to seeing the exhibit. This item has to do with the finite resources of the earth, and is a point that is covered specifically in the first film, reinforced in the Marsh, and reflects one of the major informational objectives of the exhibit. The cell immediately below shows that 89% of the Ph.D.s who had seen the exhibit got this item correct. (Again, the reader is cautioned that the small number of people in the Ph.D. category makes the percentage differences appear abnormally large. Eighty-nine percent of 9=8, so that, in effect, one post-Ph.D. missed item 7.)

Looking down the first column, one can see how other educational groups did on this item. In general, the college group did very well on this subject on the pretest, leaving little room for improvement on the posttest. The "high school" group, however, did less well, and showed a sizable gain. The "some high school" pretest group also did relatively poorly on this item, but did even less well on the posttest. (Again, the small N--number of subjects--magnifies the percent difference.)*

*It should be noted that the Ns for these analyses (Table 4) are slightly higher for some groups than they were as shown in Table 3. This is because missing data in the latter case invalidated an individual total score, and it was not used. Thus, two pre-Ph.D.s failed to respond to some of the items and the total N=11 for this group in Table 3. But since all the pre-Ph.D.s answered most items, the total N=13 in Table 4. Where items responses were missing, the denominator for the calculation of % would be the actual number answering that item, not the group total.

Table 4

Questionnaire Item Results, Pre and Post, As They Relate to Exhibit Content and Goals, by Educational Groups

	Film 1 & Marsh					Film 2 & Toolmaker						Personal Commitment & Involvement			Need for Social Change		Summary
	Items					Items						Items			Items		
	7	8	9	11	12	1	4	5	10	13	14	2	15	16	3	6	Average for All Items
Ph.D.																	
(N=13) Pre	100*	69	92	90	83	100	85	85	46	100	85	100	100	92	85	61	84.1
(N= 9) Post	89	78	89	71	78	89	89	100	33	100	78	100	78	100	78	100	83.3
MA																	
(N=28) Pre	93	54	79	88	81	96	93	93	46	100	70	79	92	93	89	89	78.4
(N=23) Post	96	61	83	91	96	100	100	100	50	87	77	96	91	96	95	87	87.2
BA																	
(N=37) Pre	100	54	84	56	89	95	97	89	41	97	62	83	83	95	86	78	81.6
(N=55) Post	91	65	83	85	96	96	94	89	54	95	89	78	85	91	79	88	84.1
Some College																	
(N=55) Pre	89	51	65	77	96	93	96	84	29	95	64	84	87	87	84	87	78.0
(N=37) Post	89	58	70	91	92	95	97	92	50	92	78	84	75	84	89	76	80.9
High School																	
(N=17) Pre	69	53	41	64	82	88	88	82	29	82	65	65	69	82	47	82	66.9
(N=21) Post	86	52	55	80	75	86	95	76	33	86	38	71	80	81	76	91	71.7
Some High School																	
(N= 7) Pre	71	71	43	71	43	86	100	71	43	71	43	57	86	57	43	86	65.2
(N=12) Post	58	8	42	83	83	84	83	75	50	41	33	75	50	75	58	92	61.9
Average Pre Score	88.6**	53.8	70.3	65.8	82.3	93.0	93.7	85.4	36.7	93.7	64.5	80.4	81.0	86.7	78.5	82.3	
Average Post Score	87.9	57.3	80.3	81.5	88.5	93.6	94.9	89.2	47.1	87.9	70.7	82.2	79.0	87.3	81.0	86.0	
Differential Score	-.7	+3.5	+10	+15.7	+6.2	+.6	+1.2	+3.8	+10.4	-5.8	+6.2	+1.8	-2.0	+.6	+2.5	+3.7	

*Percentage of visitors answering items in a manner consistent with the objectives of the exhibit.

**Averages are computed on basis of all individual scores and not on the average of the group scores. The latter procedure would give disproportionate weight to small groups like "Some High School."

The three bottom rows of Table 4 provide a summary of performance on each item by all groups. It is important to note the average pretest score before interpreting the difference score, since the actual change is influenced by the possible change. The average pretest score of 88.6% for item 7, for example, leaves little room for improvement.

The last column on the right side of the table summarizes the performance of the different educational groups on all items, pre and post.

In interpreting these data, a look at the items, individually and as groups, indicates how well the exhibit conveyed its primary objectives to the various educational groups. Item 7 has been discussed and, in general, represents a type of item that could be characterized as "already known" (89% correct on the pretest). This could also be said of item 12 (82%), which is more surprising since it is somewhat technical compared to item 7. However, considerable gain was shown on item 12 (6.2%), primarily because of the dramatic gain of the "some high school" group on this item (43% to 83%). While one would like to attribute this gain to the exhibit, the small N makes this a questionable assumption.

Item 9 is intermediate in the "already known" category (70% average on the pretest). It also shows the second highest average gain in this group of items (10%).

Item 11 shows the highest gain (15.7%). It appears to be true that the exhibit does, in fact, "teach" this point to about half of those who don't already know it. (That is, since 65.8 already know it, approximately 34% more could have learned it, but in fact, only 15.7% did.)

The opportunity to "teach" was most dramatic in this group for item 8, concerning the loss of energy from the sun. Only 53.8% of those entering the exhibit obtained the correct answer, and thus there was considerable "room for improvement." However, very little improvement was shown (3.5%). One would have to conclude that the point is not adequately conveyed by the exhibit.

The second group of items can be looked at in a similar way. Items 1, 4, 5, and 13 have high "already known" scores. Three of these have very low gain scores (1, 4, & 5). Item 13, however, actually shows a fairly sizable loss, accounted for by decreased post scores in the MA group, BA group, some college group and some high school group, but particularly the latter. It is possible that the item itself is ambiguous or misleading in the sense that labor-saving devices (technology) decrease man's need for energy (less work to do). However, this interpretation seems much more involved and abstract than what appears to be the more direct and obvious interpretation. In any case, one ought to assume that this negative finding is exhibit-related and proceed accordingly to look for possible reasons.

Item 4 is interesting in the sense that the Ph.D. group scored the poorest of all on the pretest. In fact, 1 "Agreed" and 1 "Strongly Agreed" that population growth is not going to be a serious problem in the future. In contrast, all of the "some high school" group thought that it was going to be a serious problem.

Item 14 was in the middle of the "already known" items. About 36% of the visitors missed it on the pretest and 29% on the posttest. This item is somewhat abstract in terms of exhibit content and it is not surprising that it was missed by about 1/3 of the visitors, pre and post. However, the BA and "some college" groups did very well in terms of gain on this item.

The item out of this group creating the greatest difficulties for the visitor was item 10, an abstract and difficult statement drawing from ideas contained in both the second film and the Toolmaker area. It represents an opportunity to show that a clearer understanding had been achieved of the penalties involved in man's interference with nature. While there was, in fact, a 10.4% gain on this item (i.e., 10.4% more of the posttest group than the pretest group did not agree that man's ability to manipulate the natural world is one of "man's supreme accomplishments"), it realized less

of its potential for absolute gain than any other item (except those that have a loss, pre to post). However, since it is an item that even well-qualified ecologists and environmentalists tend to agree with, its relatively poor showing is not surprising.

The next two groups of items involve concepts that are derivatives of the exhibit message per se. The notion that the individual viewer must become involved in the effort to reduce the misuse of natural resources, reduce pollution, etc. (items 2, 15, and 16) is not made explicitly, but the idea is, in many ways, the "bottom line" of all of the other objectives of the exhibit. Unfortunately, it is not possible to determine this point to any great extent because over 80% of the visitors in the sample already expressed such a concern and commitment (on a verbal level, of course). Nevertheless, out of the group of 20 visitors of each 100 who could have been influenced, very few were. Perhaps commitments of this sort are not generated in a matter of minutes, regardless of the strength of the message. On the other hand, a more explicit statement with regard to the individual and what he could do might show more positive results. (Several comments to that effect were made by visitors in the oral portion of the post interview.)

The last group of two items (3 and 6) are meant to tap the more social and long-range implications of man's abuse of nature. This message has already been delivered to 80% of the college visitors prior to their attending the exhibit and relatively few of the non-converts in these groups "see the light" as a result of the exhibit experience. However, in the high school and some high school groups, sizable gain scores were realized.

Finally, the last column of Table 4 summarizes the findings across all items for each educational group. There is an almost perfect correlation between the educational level of the visitor and the average score on the pretest, lending some credence to the notion that the educational

background of the visitor is a major determinant of his knowledge/attitude in the environmental/ecological domain. Not all groups, however, showed equal gains in scores, and two of them at the extreme ends, in fact, showed a loss; Ph.D. and "some high school"! While the losses are small, they reflect what could be two very speculative generalizations based on the small samples: (1) at the Ph.D. level there is relatively little room for new learning in the area of concern, and (2) at the "below high school" level there is little interest in learning, or ability to learn, new things in those areas. While the latter group was not a primary target audience for MIHE, it deserves your careful attention in terms of the achievement of positive learning and attitude change by means of such interpretive exhibits, for their potential for "growth" appears to be sizable (again, based on the admittedly small numbers of them in this study). But it is those small numbers that present the second part of the problem as well as a dilemma. If the less well educated do not come to the museum because they find little that they can understand or that interests them, and if the exhibits are not designed to appeal to this group because they do not come to the museum, then a self-defeating, and self-fulfilling cycle has been established. Data such as are presented here can, perhaps, provide the documentation needed to break the cycle.

Another way of looking at the data in Table 4 is to consider only the direction of change rather than the amount of change. While a less sensitive measure, it does indicate more clearly basic trends in the data. Since, as noted, positive change is difficult to achieve when pretest scores are high, only those pretest scores below 80% were included in this directional analysis. Also, the items looked at were confined to those dealing with factual information. The results are shown in Table 5.

It is clear from this analysis that the direction of change for all educational groups except "some high school," and PhD, is predominantly in a positive direction. Also, the combined pre- and posttest scores showed that all changes were positive. A simple Sign Test on these data shows that the combined differences for the MA, BA, Some College, and High School groups are significant at the .01 level.

Table 5

Direction of Change for Factual Items With Pretest Score Below 80%

	Items											No. Plus	No. Minus
	7	8	9	11	12	1	4	5	10	13	14		
PhD	NA*	+	NA	NA	NA	NA	NA	NA	-	NA	NA	1	1
MA	NA	+	+	NA	NA	NA	NA	NA	+	NA	+	4	0
BA	NA	+	NA	+	NA	NA	NA	NA	+	NA	+	4	0
Some College	NA	+	+	+	NA	NA	NA	NA	+	NA	+	5	0
High School	+	-	+	+	NA	NA	NA	NA	+	NA	-	4	2
Some H. School	-	-	-	+	+	NA	NA	+	+	-	-	4	5
Total Sample	NA	+	+	+	NA	NA	NA	NA	+	NA	+	5	0

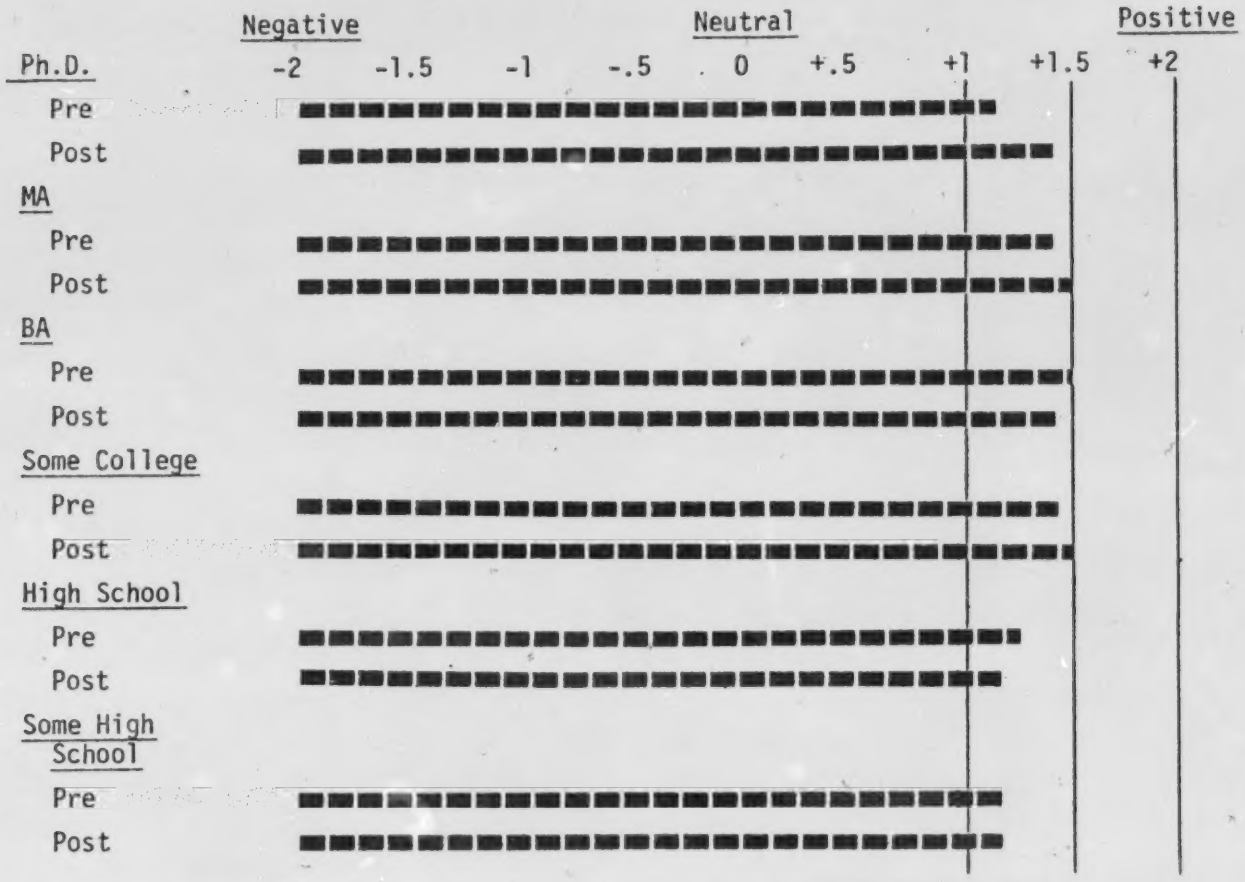
*Pretest score above 80%, so not applicable to this analysis.

To complete the discussion of the pre- post-questionnaire, a graphic presentation of the semantic differential data is presented in Table 6. While Table 3 presented the computed scores based on assigned weights to each response category, Table 6 shows where each educational group falls on the semantic differential scale itself, with +2 representing the most positive side of the adjective pairs, and -2 representing the most negative. It is obvious that the overall attitude toward nature of those visitors who have not yet seen the exhibit is quite high, and that relatively little change is possible as a result of seeing the exhibit. While none of the differences is significant, three of six comparisons are in a positive direction, two in a negative, and one shows no change.

One item tended to account for a disproportionate share of the negative scores on the semantic differential and that had to do with the concept of a limited nature. Fifty-three percent of the pretest group and 56% of the posttest group thought of nature as "unlimited." Also, the higher educational levels tended to be less positive about concepts such as living--dead, and beautiful--ugly. A slight drop is noted in this latter dimension between pre- and post-groups. Nine percent fewer visitors in the posttest group

Table 6

Attitudes Toward Nature, Pre and Post by Educational Grouping



felt that nature was "beautiful." (It was considered possible that the first film might create in visitors an aversive response toward "nature," since it showed animals attacking and eating each other, decayed matter being eaten by crabs, etc., but, if so, it was reflected in the scores of only a few people on the directly relevant items.)

Oral Interview Results

The oral interview items provide a fairly direct and uncontaminated picture of what the visitor "thinks" and how he "feels" about the exhibit experience. There are, however, four sources of difficulties with such information. First, it depends on the "articulateness" of the visitor, and thus biases the results along this dimension (which is probably highly correlated with educational level). Second, it depends on the ability of the interviewer to accurately record the responses. Third, the quantification of the responses is a judgmental task, even though categories are defined and weights assigned to them by careful comparison of response and category. Fourth, there are no external bases for comparisons of responses since the items are all exhibit-related. (Internal comparisons between groups are, of course, possible.)

These problems notwithstanding, the oral interview responses provide a rich source of information, some quantitative and some qualitative. The quantitative analysis is presented below, with its interpretation aided by the qualitative material. (Sample and/or particularly interesting quotations from actual visitor responses are contained in Appendix B. The reader is encouraged to examine these in the context of the material to follow. The Appendix is organized by educational level and by item number.)

Table 7 presents the results of the analysis of the oral interview information, except for items 9 and 10 which are looked at separately. Results are shown in terms of the number and percent of coded responses to each item, by educational group. It is possible from this table to see

Table 7

Individual Responses to Interview Items by Educational Grouping

Items and Response Categories		Ph.D.		MA		BA		Some College		High School		Some High School		Summary	
		%	N	%	N	%	N	%	N	%	N	%	N	%	N
1.	5	11	1	39	9	15	8	11	4	19	4	3	4	19	30
	4	67	6	52	12	58	32	68	25	57	12	50	6	59	93
	3	22	2	9	2	16	9	16	6	14	3	17	2	15	24
	2	0	0	0	0	5	3	5	2	0	0	0	0	3	5
	1	0	0	0	0	5	3	0	0	10	2	0	0	3	5
2.	5	22	2	4	1	5	3	16	6	5	1	8	1	9	14
	4	56	5	83	19	82	45	57	21	52	11	58	7	69	108
	3	11	1	13	3	11	6	19	7	19	4	25	3	15	24
	2	0	0	0	0	0	0	8	3	14	3	8	1	4	7
	1	11	1	0	0	2	1	0	0	10	2	0	0	3	4
3.	3	11	1	4	1	0	0	11	4	14	3	17	2	7	11
	2	22	2	13	3	31	17	19	7	10	2	0	0	20	31
	1	56	5	65	15	45	25	43	16	71	15	75	9	54	85
	3a	11	1	17	4	24	13	27	10	5	1	8	1	19	30
4.	5	22	2	17	4	2	1	22	8	0	0	8	1	10	16
	4	67	6	78	18	74	41	43	16	48	10	50	6	62	97
	3	11	1	0	0	11	6	19	7	24	5	33	4	15	23
	2	0	0	0	0	0	0	3	1	14	3	0	0	3	4
	1	0	0	0	0	0	0	0	0	5	1	0	0	1	1
	0	0	0	4	1	13	7	13	5	9	2	8	1	10	16
5.	5	22	2	9	2	4	2	8	3	0	0	8	1	6	10
	4	44	4	52	12	62	34	38	14	48	10	50	6	51	80
	3	11	1	17	4	14	8	19	7	19	4	25	3	17	27
	2	11	1	4	1	2	1	3	1	0	0	0	0	3	4
	1	11	1	0	0	4	2	0	0	9	2	0	0	3	5
	0	0	0	17	4	14	8	32	12	24	5	17	2	20	31
6.	3	33	3	39	9	27	15	19	7	14	3	17	2	25	39
	2	0	0	30	7	11	6	3	1	19	4	17	2	13	20
	1	56	5	30	7	62	34	78	29	62	13	66	8	61	96
	0	11	1	0	0	0	0	0	0	5	1	0	0	1	2
7.	3	22	2	22	5	22	12	8	3	10	2	0	0	20	24
	2	0	0	4	1	11	6	13	5	14	3	8	1	13	16
	1	44	4	52	12	47	26	54	20	43	9	67	8	66	79
	0	33	3	22	5	20	11	24	9	33	7	25	3	24	38
8.	3	33	3	65	15	55	30	51	19	43	9	25	3	50	79
	2	22	2	22	5	25	14	32	12	19	4	33	4	26	41
	1	0	0	0	0	0	0	3	1	5	1	0	0	1	2
	0	44	4	13	3	20	11	14	5	33	7	42	5	22	35

how many visitors gave each response. For example, Interview item #1 had five categories into which answers were grouped and scored. In the MA group, 9 of the 23 MAs in the sample (39%) answered the question very well and received a score of 5. The right column shows the totals for each response category. (The response categories are shown in Appendix A, page 4.)

Using this table, a detailed look at each of the oral interview items can be taken.

The first item in the interview, "What was your overall reaction to the exhibit you just saw?", was used partly as a warm-up item to get the interview started, but also to provide an unstructured opportunity to say whatever the visitor had "on his mind" about the exhibit. The responses were generally very favorable. Only 10 visitors had a negative response to the overall exhibit. Eighty percent were positive or very positive. (Several of the more critical remarks are quoted in Appendix B.) There is a well-documented response bias to such questions, however, that tends to produce overly positive results. That is, people tend to tell the interviewer what they think he or she wants to hear. The remaining items avoid this tendency by requiring the visitor to respond to specific requests for information related to the exhibit.

Item 2 is a critical one in terms of indicating the visitors' level of understanding of the basic message of the exhibit. If nothing else happened as a result of the exhibit experience (which is certainly not the case), one would at least hope that the visitor could articulate, in an understandable way, the thrust of the environmental message that is the focal point of the entire display.

From Table 7, it is possible to say that a large number of visitors at all educational levels could do that fairly well (69% got a score of 4) and about 9% of the visitors could do it very well (a score of 5). Only 22% of the visitors received a rating of 3 or below. (One Ph.D. received a low

rating for saying that the basic message of the exhibit was "The disparity between our country and others in the world." Again, the reader is reminded that a sample of quotations from the responses actually given are contained in Appendix B.)

The distinction made between a score of 4 and 5 was in the "richness" of the answer. Any statement that noted a "concern for nature," or for "our resources," or "man's impact on nature," or "man's need to protect or conserve nature," received a 4. Any additional information that showed, for example, an awareness of the need to change our way of life, or a need to reduce population levels, would qualify the response for a 5. These are admittedly liberal criteria, but they were used to avoid (or minimize) some of the impact of the "articulation" bias noted earlier.

Item 3 got at the critical area of personal involvement: "Is there anything you personally feel you will do as a result of seeing the exhibit?" The maximum score here was "3," given for noting more than one thing "I would do." Noting only one thing received a "2," and "nothing" received a "1." (The 3a category meant "already doing something.") While slightly more than half said that they would do nothing as a result of seeing the exhibit, a large percentage said that they would (27%) or are already doing something (19%). The lower educational groups seemed least inclined to see opportunities for personal action, supporting the point that this message may not be strong enough for these visitors. (Naturally, a statement of intent, and the behavior consistent with that intent, are two very different things. One should have no illusions that those who say they will not use throw-a-way cans and bottles--a high frequency response--will actually do so.)

Item 4 relates to the first film--"What was the main point . . . ?" A score of 5 indicates that more than one valid point was noted, 4=one point, 3=unable to say, 2=missed point somewhat, and 1=missed it badly. A zero was assigned to those who did not see the film. Clearly, most people in all educational groups could note at least one point that was covered by the film (e.g., food chain, flow of energy, balance of nature, etc.). The

college groups were able to mention more than one point at a higher frequency than could the other groups. Relatively few in this post interview group missed the film (10%).

The second film (Item 5, Table 7) was scored the same way as the first film. In general, the profile of responses was the same as for the first film, except that its effectiveness and appeal are more general and even across educational groups, but not quite as high as for Film #1. Also, twice as many visitors missed the second film as missed the first film.

Items 6 and 7 cover two areas of the exhibit that have special significance, since they attempt to convey an important, but difficult and subtle, message, and to do it without making the point in an overt and obvious way. In fact, the sculpture was the object of an earlier investigation, in which a clay model was pretested to determine its ability to convey its message before it was executed in its final configuration. This mock-up evaluation indicated that the sculpture would not, by itself, get its story across to the vast majority of viewers.

The results of this study tend to confirm this prediction. Sixty-one percent of all the posttest visitors made an incorrect statement about the message of the sculpture (response 1, Item 6, Table 7). The vast majority of these incorrect statements related to the similarity of man and animal rather than to the difference between them. In addition, 13% of the answers were vague or ambiguous. Thus, only 25% of the visitors were able to state the intended message. (To help visitors remember the sculpture, a picture of it was shown to them at the time the question was asked. This could be expected to improve the results somewhat over a total recall situation.) The educational level of the visitor was related to his or her ability to answer this item, with the college group average being 27% correct and the non-college average being 15% correct.

Item 7 relates to the entire Toolmaker area, but does so in the context of its two major elements, the wooden swing plow, and the modern plow. Being able to state that the purpose of this display is to illustrate the "mixed blessing" of modern technology in terms of energy consumption and finite resources would enable the posttest visitor to receive a rating of 3 on this item. Only 20% of the visitors who saw the display were able to receive such a rating, the majority of them being in the higher educational levels. The majority of visitors either got the wrong answer (66%) or made a statement that could not be interpreted either way (13%). Twenty-four percent of the test group did not see the entire display. The vast majority of this group missed seeing the modern plow.

The Paton quote was displayed throughout the exhibit, representing a kind of leitmotiv. Item 8 (Table 7) shows that one-half of the visitors were able to give an acceptable paraphrase of the quote when shown a copy of it. Surprisingly, 22% did not recall seeing it in the exhibit itself.

Items 9 and 10 of the oral interviews are of particular interest in that they provide the visitor an opportunity to indicate particular exhibit likes and dislikes. A detailed analysis of the results is shown in Table 8. The "winner" in this popularity contest is clearly the second film, with 36.9% of the visitor mentioning it. Next in order is the first film, making the two films the outstanding attraction of the exhibit in the minds of most visitors. However, the Marsh runs a close second, and for the MA and "some college" groups is actually number one. Interestingly, the two lower educational groups liked neither the Marsh nor the first film very much, but "peaked" on the second film, giving the latter a more universal visitor appeal. Only 6 out of the 157 visitors interviewed singled out the Sphere of Life as an area they liked, 3 the Message area, and 3 the Toolmaker area.

Item 10 looks specifically at "dislikes" (lower portion of Table 8). Here again, the reluctance of visitors to be critical plays a role of unknown

Table 8

"Likes" and "Dislikes"

	N=12 Some High School		N=21 Completed High School		N=37 Some College		N=55 BA		N=23 MA		N=9 PhD		N=157 Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Was there any one special thing or part of the exhibit that you found particularly interesting? (Multiple response possible.)														
Everything	0	-	5	23.8	9	24.3	7	12.7	4	17.4	2	22.2	27	17.2
Sphere of Life	1	8.3	0	-	2	5.4	2	3.6	1	4.3	0	-	6	3.8
Theater #1	1	8.3	4	19.0	11	29.7	16	29.0	6	26.0	3	33.3	41	26.1
Marsh	1	8.3	2	9.5	12	32.4	10	18.2	9	39.1	3	33.3	37	23.6
Toolmaker	1	8.3	0	-	2	5.4	0	-	0	-	0	-	3	1.9
Theater #2	5	41.7	7	33.3	10	27.0	27	49.1	5	21.7	4	44.4	58	36.9
Message	0	-	0	-	1	2.7	2	3.6	0	-	0	-	3	1.9
Paton Quote	1	8.3	1	4.8	0	-	0	-	0	-	0	-	2	.6
Nothing in Particular	3	25.0	3	14.3	0	-	3	5.5	3	13.0	1	11.1	13	8.3
													190	
Was there anything that you didn't like or understand? What did you like least? (Multiple response possible.)														
Like "everything"	7	58.3	17	80.9	23	62.2	26	47.3	8	34.8	6	66.7	87	55.4
Sphere of Life	1	8.3	1	4.8	3	8.1	2	3.6	1	4.3	2	22.2	10	6.4
Theater #1	1	8.3	0	-	0	-	4	7.3	0	-	0	-	5	3.2
Marsh	0	-	0	-	0	-	1	1.8	0	-	0	-	1	.6
Toolmaker	0	-	0	-	5	13.5	1	1.8	2	8.7	0	-	8	5.1
Theater #2	0	-	0	-	0	-	5	9.1	1	4.3	0	-	6	3.8
Message	1	8.3	1	4.8	0	-	4	7.3	4	17.4	0	-	10	6.4
Miscellaneous	2	16.6	1	4.8	6	16.2	14	25.5	7	30.4	1	11.1	31	19.7
													158	

but finite magnitude. Slightly over half the visitors refused to identify any area as one they did not like and/or understand. (There were only a total of 71 specific dislike responses vs. 150 specific like responses.) However, the Sphere, the Message, and the Toolmaker areas were noted most often as "dislikes," complementing their low incidences of occurrence on the previous question.

Visitor Observation Results

The observation data presented in this section provides another, but complementary, dimension to the evaluation of MIHE. Pre- and posttest scores may be considered the "input" and "output" of the study; visitor observations represent the process by means of which the individual got from one point to the other. If the questions asked are relevant to the goals and objectives of the exhibit, then changes or lack of changes in the ability of visitors to answer those questions are attributable to the visitor's specific interaction with the various elements that make up the total exhibit experience. The observational data collected in this study are quite detailed and provide a rich source of information on a variety of topics.

Table 9 presents the total time spent in each major area of the exhibit by each of the 75 visitors who were observed. Demographic data on each visitor is also shown in this table. Overall average times for visitors to each area are shown on the bottom of the table; overall average times for each visitor to all areas is shown on the right side of the table. Thus, all 75 visitors spent an average time of 1 minute, 21 seconds in the Sphere area; visitor #1 spent a total time of 15 minutes and 55 seconds in the entire exhibit. Since some visitors left the exhibit area before seeing all of it, the denominator for computing average times changed from one area to another. For this reason, average times for each area were computed two ways, one that includes the impact of those who did not get to that area of the exhibit, and one with such individuals removed from the computation. Thus, the two rows at the bottom of Table 9 are labeled, "With missing data" and "Without missing data." To answer the question, "What is the

Table 9

Individual Time Data for Each Area of the Exhibit

Individual	Exhibit Area: Sphere	Theater #1	Marsh	Toolmaker	Theater #2	Message	Total*	Additional Information: Sex (M-Male) (F-Female)	Age**	Single (S) Group (G)	Crowd++
1	:25	13:39	:36	:30	:25	:20	15:55	F	21-30	G	FC
2	3:15	14:35	5:05	1:55	22:25	1:15	48:55	F	21-30	G	VC
3	2:05	2:45	1:15	:55	2:00	:45	9:45	M	31-50	S	FC
4	1:20	13:45	5:25	3:05	22:15	:30	45:20	M	31-50	G	VC
5	4:00	18:05 (Exit)	----------				22:05	F	50+	G	FC
6	1:30	7:35 (Exit)	----------				9:05	F	21-30	G	VC
7	4:30	15:20	4:00	1:45	27:45	1:05	57:35	F	21-30	G	FC
8	1:20	10:48 (Exit)	----------				12:30	F	31-50	G	NVC
9	5:50	12:40	8:24	2:45	1:42 (film broke)	:20	32:27	M	31-50	G	FC
10	1:20	:09	2:13	:50	:08	1:16	7:36	F	50+	G	VC
11	:40	14:47	:40	:37	:13	:20	18:05	M	21-30	G	VC
12	:40	13:40	:40	1:15	22:45	:10	39:10	F	31-50	G	NVC
13	1:05	13:50 (Exit)	----------				15:00	M	21-30	G	FC
14	2:35	14:00	2:35	1:25	24:00	:23	45:23	F	31-50	G	FC
15	:15	14:15	:30	:35	:25 (Exit)	----------	17:20	F	31-50	G	VC
16	2:55	14:00	4:05	3:25	23:50	1:13	49:43	M	50+	G	VC
17	2:05	12:58	1:02	1:55	24:03	:57	43:00	M	31-50	G	VC
18	2:25	1:10 (Exit)	----------				3:35	F	16-20	G	NVC
19	:55 (Exit)	----------					:55	F	21-30	G	NVC
20	:52	12:58 (Exit)	----------				13:50	M	31-50	G	NVC
21	:20	13:16 (Exit)	----------				13:50	F	31-50	G	NVC
22	1:10	13:10	2:20	1:50	24:35	:35	44:15	M	21-30	G	VC
23	1:20	12:40	1:15	1:15	8:30	:33	26:33	M	31-50	G	FC
24	1:12	13:58	3:38	1:21	20:42	:20	41:46	M	21-30	G	FC
25	:25	14:30	11:15	:50	:05	1:00	28:35	M	31-50	G	FC
26	:15	:05	:10	:30	:15	:30	2:20	F	31-50	G	VC
27	1:50	13:00	2:10	:50	4:30	:13	23:13	M	31-50	G	FC
28	:20	14:00	1:10	:25	5:00	1:40	23:45	F	16-20	G	FC
29	1:45	4:00 (Exit)	----------				6:45	M	50+	G	FC
30	4:00	3:00 (Exit)	----------				7:30	M	31-50	G	NVC
31	:20	14:32	1:48	:40	22:45	:25	40:30	M	50+	G	NVC
32	1:00	4:00	4:00	1:00	5:00	:30	15:30	M	50+	S	NVC
33	:40	13:30 (Exit)	----------				14:20	F	31-50	G	NVC
34	:55	2:00	:10	:20	:10	:20	4:00	M	21-30	S	NVC
35	:40	:15	:40	:45	21:16	1:30	25:06	M	50+	S	NVC
36	:10	:15 (Exit)	----------				:25	M	21-30	G	NVC
37	:40	11:50	1:20	:30	21:40	1:15	37:15	M	31-50	G	NVC
38	:50	5:00	:10	:05	:05	:05	6:20	M	16-20	S	NVC
39	6:45	13:35	21:20	7:00	21:40 (Exit)	----------	70:20	M	50+	G	NVC
40	:45	2:30	:20	:55	2:35	:20	8:03	M	31-50	G	NVC
41	:43 (Exit)	----------					:43	M	16-20	G	NVC
42	1:35	13:25	3:40	1:50	15:00	:20	36:00	M	31-50	G	NVC
43	:50	11:10	:15	:40	24:00	1:00	39:00	F	21-30	G	NVC
44	1:30	13:30	2:00	2:00	6:00	:30	26:30	M	31-50	G	NVC
45	1:05	14:50	2:55	1:50	19:15	:45	41:04	M	50+	G	FC
46	1:40	14:50	4:30	1:50	23:45	1:10	48:20	M	21-30	G	NVC
47	:30	12:40	2:40	:45	21:35	:40	38:50	M	31-50	G	NVC
48	:15	5:40	:45	:30	5:10	:25	12:45	F	21-30	G	NVC
49	:40	14:45	9:00	2:15	24:05	:35	51:20	M	50+	S	NVC
50	:30	15:00	:50	1:10	24:15 (Exit)	----------	44:00	F	50+	G	NVC
51	2:00	13:25	4:20	2:25	22:15	3:03	49:03	F	31-50	G	NVC
52	2:25	16:00	1:40	3:40	23:55	1:20	50:27	F	50+	G	NVC
53	2:55	15:00 (Exit)	----------				18:15	M	50+	S	NVC
54	1:05	9:50 (Exit)	----------				11:00	F	21-30	G	VC
55	2:45	12:13	2:49	:55	24:30	:18	43:50	F	21-30	G	FC
56	:15	:00	:00	:00	15:35 (Exit)	----------	18:10	F	21-30	G	FC
57	1:30	13:35 (Exit)	----------				15:20	F	50+	G	FC
58	:20	9:30	:20	2:01	4:20	:20	17:20	M	21-30	G	NVC
59	1:12	12:30 (Exit)	----------				13:02	M	21-30	G	FC
60	:40	14:27	:35	:23	24:08	:23	41:40	M	21-30	G	VC
61	1:04	14:56	1:30	1:10	23:20	:14	42:14	M	21-30	G	FC
62	:45	14:00	:00	:25	24:05	:00	40:20	M	21-30	G	FC
63	:53	14:45	1:05	:47	24:45	:55	42:35	F	21-30	G	VC
64	1:00	1:00	5:45	2:40	25:20 (Exit)	----------	35:50	F	50+	G	FC
65	:45	13:00	:15	:15	9:40	:05	24:00	M	31-50	G	FC
66	3:20	14:40	3:00	3:00	22:00	:45	47:00	M	21-30	G	NVC
67	1:22 (Exit)	----------					1:22	F	21-30	S	NVC
68	:55	13:35	:35	1:00	:35	:10	17:25	F	31-50	G	NVC
69	:19	15:00	3:30	:45	22:10	:10	41:50	M	21-30	G	NVC
70	1:00	26:00	8:00	5:00	16:00 (Exit)	----------	56:00	F	21-30	G	NVC
71	:40	15:03	1:00	:30	1:40	:30	19:40	F	31-50	S	NVC
72	1:50	14:00 (Exit)	----------				15:50	M	50+	S	FC
73	:15	:45	:05	:00	25:00 (Exit)	----------	26:00	F	16-20	G	NVC
74	:05	:40 (Exit)	----------				:55	M	31-50	S	NVC
75	:60	:30 (Exit)	----------				:90	F	21-30	G	NVC
With Missing Data: x	1:21	10:30	2:00	1:02	10:42	:25	26:16				
Without Missing Data: x	1:21	10:54	2:46	1:26	14:52	:40	32:11				

TOTALS:

Female--34 Male--40
16-20 -- 3 21-30--28 31-50--25 50+--16
Group--63 Single--11
VC=13 FC=23 NVC=38
Exit out of entrance--23 (36%)
Exit after Theater #1--17 of 27

KEY: (Exit)=went out through entrance
++Crowd--VC=very crowded; FC=fairly crowded; NVC=not very crowded
* Total figure often higher than sum of area figures due to "transit time"
**Age Groups: 16-20, 21-30, 31-50, 50+

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average time spent in the second film by the total group of visitors in the observation study?", the answer would be, "10 minutes and 42 seconds." However, if the question is directed only at those who entered the theater, the total would be 14 minutes and 52 seconds. The distinction may seem unnecessary at the area level, but it is more meaningful when considering the answer to the question, "How long does the average person spend in MIHE?" The answer would be "26 minutes and 36 seconds." However, if one asked the question only about those who go through the entire exhibit, then the answer would be "32 minutes and 11 seconds."

The overall behavior of each visitor can be seen quite clearly from Table 9. Particularly interesting is the number of visitors who did not complete the entire exhibit. These are shown by arrows, starting at the point at which the exit was made. It should be noted that an exit visitor was defined only as someone who left the exhibit through the entrance, and not someone who walked quickly through the entire exhibit (see Visitor #26 on Table 9). A very high percentage (36%) of people failed to complete the exhibit. Most of them exited after the first film (23%); three left from the Sphere, and seven after the second film. Interestingly, 9 out of the 17 who exited from the first theater stayed long enough to see the entire film; 6 of the 7 who exited from the second theater stayed long enough to see most or all of that film.

Individual variations in time spent in an area are quite dramatic, as are the variations in average time between areas. One person (#39) spent 1 hour and 10 minutes in the exhibit, and 21 minutes in the Marsh alone.

The two films were the major "time consumers" of the exhibit, with average times being close to actual running times (i.e., a holding power ratio of almost 1/1), and accounting for an average of 80% of the total time spent by each visitor in the exhibit. This is a strong endorsement of the interest these films have for most viewers.

The remaining areas show little evidence of such holding power, with averages running quite a bit below what would represent a complete and careful perusal of the various elements in the area. This is particularly true of the Marsh which has the highest average time (after the films, of course), but which would require considerably more time to read and study the information contained in it. Actually, it would take the average reader 5 minutes, 15 seconds to read all of the label material in the Marsh. Looking at the display itself to answer the questions on the reading rail, plus walking time, would add another three minutes (approximately), for a total viewing time of 8 minutes, 15 seconds. Given the average viewing time of 2 minutes, 46 seconds, this puts the holding power ratio of the Marsh at .21/1 (e.g., actual time is 21% of total time).

The Sphere and Toolmaker areas are next in holding power, at .32/1 each. This is based on 1 minute and 17 seconds reading time plus 3 minutes "looking" time for Sphere, and 32 seconds reading time plus 4 minutes looking time for Toolmaker.

It should be noted that the Sphere Area was intended primarily as an introduction to the exhibit and an "inducement" to see the remaining areas. Since only 3 of the 75 visitors entering the Sphere exited from the Sphere, it must be considered a success in that regard. On the other hand, a tape-recorded "orientation to the exhibit" message that is heard in the Sphere area takes 1 minute, 45 seconds to play in its entirety, with a 30 second gap between playings. Only 19 visitors could have heard it all, assuming they came in just as it started. Add to this the fact that "brochure taking and looking behavior" would be expected to occur in the Sphere area, if at all, and one is led to conclude that this section of the exhibit is not holding the average visitor as long as it should. Perhaps 3 minutes would be a more realistic figure to use as an "expected" holding time for the Sphere, in which case its holding power ratio would be .40/1 rather than .32/1.

The Message area is very similar to the Marsh in its holding power; although it has a much smaller average time figure (40 seconds), it also has much less for the visitor to "do." Its holding power ratio is .24/1. Again, expectations play a role in determining true holding power. It was not expected that people would spend more than "30 seconds or so" in the Message area. On this basis, it was doing its job. Nevertheless, there are things to see, labels to read and a message to be conveyed. These things cannot happen in 30 seconds, which is just about the time it takes to walk through the area at a slow pace.

To provide a more diagnostic look at total exhibit time in relation to demographic variables, Table 10 was prepared. From this table, one can

Table 10

Total Exhibit Time by Visitor Type and Exhibit Crowding

	Average Time (Hrs. & Secs.)	N
Male	27:38	40
Female	25:24	34
Ages 16 - 20	12:05	5
Ages 21 - 30	27:38	28
Ages 31 - 50	25:00	25
Ages 50+	31:51	16
Single	15:16	11
Group	28:35	63
Very Crowded	29:06	13
Fairly Crowded	27:48	23
Not Very Crowded	24:59	38

compare sex, age, group, and exhibit crowding conditions as they impact on time spent in the exhibit. Several of these comparisons are of general interest. Male and female times are quite close, but since most visitors were in groups (63 vs. 11) and most groups were mixed male and female, there would be a tendency for this relationship to be close. There are too few "singles" (11) to enable one to look meaningfully at the male/female/single interaction.

The data suggest that age may have a relationship to time. The "16 to 20" age group averaged a very low 12 minutes, but the small number of visitors in this group make it difficult to generalize. Similarly, the highest age bracket (50+) had the highest average time (31 minutes, 51 seconds) but had relatively few "members" (16). Also, the youngest and oldest visitors accounted for a disproportionate share of the early exit group.

Those visitors who were with a group had much higher total times than those alone (28:35 vs. 15:16). However, the "alone" group is small; it would be interesting to see if this relationship held up in further analyses of this type.

Finally, Table 10 shows that exhibit crowding has an effect on total time, i.e., the more crowded, the longer the time spent in the exhibit. While this could be expected in the sense that it takes longer to "see things," when the area is crowded, it might have produced the opposite effect, i.e., visitors leaving or rushing through because of the crowded conditions. Additional data along these lines would help to further clarify what is probably a highly complex interaction between exhibit and demographic variables.

To complete the discussion of the observation results, a very detailed analysis of what the visitors did at each location within an area is shown in Table 11. Each area of the exhibit was broken down into an identifiable location or element, representing something to look at or to read. The last four pages of Appendix A contain copies of the data recording forms for the observation study, where visitor responses to each of these exhibit elements were recorded. The code numbers on these forms are the same as those shown on Table 11 under the area title. Thus, there are "locations" with codes from 1 to 15 and 1a to 16a for the Sphere area. It is recommended that these observation forms be detached from the report and kept visible while reading this section.

The percentage (and number) stopping at each location is shown in column 2 of Table 11, and represents the attracting power of each element. The next column shows the kinds of things the observed visitors did at each location. The code used is: L=look, R=read, T=talk, P=point, G=glance (excludes all others), F=feel and Q=question (this response applied to the reading rail only). Next is shown the average time at the location, given in seconds (holding power), for those who spent enough time to record a reading. Finally, the average stop number of that location is shown computed by averaging all of the individual numbers that indicated the ordinal position of that location in the visitors' path through the area (1st, 2nd, 3rd, etc.). This latter figure makes it possible to establish the typical visitor path through the exhibit.

The Sphere area presents a unique configuration, since it is possible to enter from two locations, each of which would predispose the visitor to see certain display elements within the Sphere area.

First, it is possible to see from Table 11 that most people entered the right entrance which is the side nearest the main entrance of the museum. The difference is quite large: 27% of the total observation group entered the left side (south) and 73% the right side (north). Brochures were usually available at both entrance areas. It is interesting to note that those who entered the left side took more brochures than those who entered the right side (50% vs. 37%). There is no obvious reason for this difference. Possibly, the guard who usually stood at the left entrance area represented an unconscious symbol of authority, and people, perhaps, were more likely to behave in an organized, "official," rule-following way.

The pattern of visitor responses in the Sphere area is confounded by the dual entrances. Those who entered "right" tended to stay right (77%), but those who entered left split evenly, half going right and half staying left. Popular locations (high attracting power) on the left and right side were (left) 7, 8, 11, 12, and 13, and (right 7a, 8a, 10a, 11a, 12a, and 15a. These areas were the objects in glass panels (e.g., jay, prairie dog, etc.,) and the interior fish scene.

TABLE 11

Summary of Observation Data by Location

Location	Percent & No. "Stopped"		Total Activities by Type*							Average Time (seconds)	Average Stop No.
			L	R	T	P	G	F	Q		
Sphere (N=74)											
1	27% (entered)										
2	50% (no brochure)										
3	50% (took brochure)										
4	5%	(4)	2	2	1	1	1			7.6	1.3
5	6.7%	(5)	2	3		1	1			-	1.0
6	17.6%	(13)	1	7	1		4			2.7	2.7
7	29.7%	(22)	12	4	3	3	10			3.6	5.4
8	39.2%	(29)	23	1	7	6	6			10.1	3.9
9	20.3%	(15)	4	1			11			1.8	5.6
10	12.2%	(9)	1	2			7			.5	6.4
11	21.6%	(16)	5	1	1		11			2.3	7.2
12	29.7%	(22)	10		4	1	12			3.0	6.8
13	25.7%	(19)	5	1		3	14			1.4	7.1
14	16.2%	(12)	1	5	1	2	6			4.3	7.8
15	33.8%	(25)	10	3	5	2	15			4.2	7.6
1a	73% (entered)										
2a	37% (took brochure)										
3a	62% (no brochure)										
4a	13.5%	(10)	5	8	1	2	1			6.3	2.1
5a	18.9%	(14)	7	1			7			-	1.0
6a	28.4%	(21)	6			1	15			2.5	5.0
7a	67.6%	(50)	37	3	9	8	13			8.9	2.6
8a	54.1%	(40)	22	5	5	4	18			4.4	3.0
9a	25.7%	(19)	3	9	1		7			3.7	2.6
10a	28.4%	(21)	7		1	2	14			3.6	4.5
11a	59.5%	(44)	24		6	8	20			6.2	4.5
12a	50.0%	(37)	17	5	6	6	19	1		3.6	5.5
13a	16.2%	(12)	2	4			6			3.0	4.8
14a	24.3%	(18)	8	1	1	1	10			3.8	7.7
15a	52.7%	(39)	22	6	4	3	17			9.6	6.8
16a	9.5%	(7)	2	1			4			-	7.4
Marsh (N=54)											
1	18.5%	(10)					10				1.0
2	24.1%	(13)	3		2		10			5.0	1.1
3	40.7%	(22)	15	9	8	2	7		6	17.1	1.9
4	51.9%	(28)	19	16	9	5	3		8	16.2	2.3
5	46.3%	(25)	13	11	7	3	7		3	25.0	2.9
6	27.8%	(15)	2		2		13			.3	2.7
7	40.7%	(22)	14	12	7	3	2		8	23.6	4.3
8	48.1%	(26)	15	13	11	6	4		4	30.8	4.8
9	46.3%	(25)	14	8	9	8	5		4	15.0	5.8
10	11.1%	(6)					6			-	5.2
11	29.6%	(16)	10	8	4	2	2		4	16.4	6.8
12	37.0%	(20)	13	11	10	2	3		3	18.9	6.6
13	37.0%	(20)	13	7	5	2	5		3	11.7	7.3
14	5.5%	(3)	1	1			2			20.0	2.7
15	33.3%	(18)	13	11	11	6	1		5	23.4	5.5
16	27.8%	(15)	12	7	8	3	2		4	26.0	5.6
17	24.1%	(13)	7	4	3	2	3		2	18.8	4.8
Toolmaker (N=54)											
1	22.2%	(12)					12				
2	98.1%	(53)	41		15	8	8	16		18.5	1.0
3	85.2%	(46)	25	4	10	4	16	8		8.0	2.0
4	87.0%	(47)	27	10	12	6	18	5		11.0	3.0
5	77.8%	(42)	24		5	5	16			5.0	4.0
6	88.9%	(48)	23	1	5	2	23			5.0	5.0
7	46.3%	(25)	1	14	1		13			.7	5.5
Message (N=47)											
1	8.5%	(4)					4				
2	55.3%	(26)	15	5	4	1	10			3.7	1.1
3	29.8%	(14)	1	7	3		6			7.3	1.7
4	68.1%	(32)	16	5	6	3	15			5.8	2.1
5	27.7%	(13)	1	6			6			4.6	3.5
6	59.6%	(28)	11	4	2	1	16			2.5	3.6
7	27.7%	(13)	1	3	1		8			1.8	4.8
8	29.8%	(14)	1	7			7			8.7	4.6

83.5% of those who entered the exhibit, completed it (i.e., left at the exit).

*L=Look
R=Read
T=Talk
P=Point
G=Glance
F=Feel
Q=Question

The locations to the left of each face of the Sphere (9, 13, 14a, 10a and 6a) were used to record general "looking" behavior at the various large color photographs that surrounded the glass panels and the windows to the interior. The end panels contained the Paton quote (6, 10, 14, 13a, 9a and 6). These areas received relatively little attention by the visitor.

Very few people read the entrance signs (particularly the one on the left side), nor did very many read the orientation material (14 in all).

Of special interest in this table is the activities engaged in by the observed visitors at each area. (Multiple responses are possible.) The Sphere, as intended, was primarily a looking/glancing area, with 238 "looks" and 249 "glances," but only 73 "read," 57 "talked," 54 "pointed" and one "felt" (the owl).

The average time per location is a measure of holding power. It is not necessarily related to attracting power (number of people stopping). Thus, location 4 in the Sphere had the lowest attracting power (5%) but the 4th highest holding power (7.6 seconds). In effect, not many visitors were induced to read the orientation panel on the left entrance, but those who were tended to find it interesting to read (although only two of the four people who stopped were noted as reading it). Contrariwise, location 12a (the owl) attracted one of the largest percentage of visitors (50%), but they spent an average of only 3.6 seconds at that location, mostly just glancing at it. High attracting and holding power areas of the Sphere are location 8 (first window to the fish on the left side), 7a (same on right side), 11a (next window on right side) and 15a (window at "top" of the display with labels of fish names).

The average stop number (last column of Table 11) clearly shows the two primary traffic patterns in the Sphere area, a left pattern and a right pattern.

The Marsh area also had two traffic patterns, and again the predominant one was to the right. This can be seen by the average stop number and the percentage stopping. The average attracting power of the north and west reading rail areas is 45%; the average attracting power of the east and south areas is 31%. (Locations 2, 6, 10 and 14 are for recording general glances and looks at the overall area without giving specific attention to the reading rail.)

Of particular interest for the Marsh area is the number of people using the question and answer technique on the reading rail; on the average, 21% of those stopping at the reading rail appeared to do so. However, the average time spent at these locations suggests a cursory, rather than intensive, use. Highest average holding times were recorded for the east rail and west rail (23 seconds each), intermediate times for the north rail (19 seconds) and lowest for the sulphur cycle (15.7 seconds). These figures should be compared to the average time required to read and "use" each reading rail, which is 1 minute, 19 seconds.

The Toolmaker area showed very high attracting power, a function, no doubt, of its linear flow pattern and lack of mutually exclusive sight lines (e.g., looking at one element does not orient the body and head away from another element, as when objects are directly across from each other on opposite walls). The sculpture received the highest attracting power figure of any object in the entire exhibit (98.1%). Only one person, in fact, did not appear to stop at the sculpture.* Holding power for the sculpture was the highest of the area (18.5 seconds), and is higher than that for half of the Marsh locations, and for all of the Sphere and Message locations. (Since there are no labels of any kind on the sculpture, it is difficult to assign an upper time limit, and therefore no ratio is computed for it.) It is also the uncontested winner in the "feelie" contest, with 30% of those visitors stopping to view it, actually touching it. Having achieved top ranking in attracting and holding power, it is especially instructive to

* All figures in Table 11 are based, of course, on those who survived to the area in question. The 21 people out of the 75 starters who never got to the Toolmaker area are not included in these calculations.

consider its poor showing in the third category of exhibit performance--teaching power.

The weakest part of the Toolmaker area (other than the introduction and exit signs) is location 5, the modern plow, although 78% of the visitors did look or glance at it. Its holding power was very low (5 seconds). This is coupled with the low holding power of the photowall (5 seconds). The quote on the wall near the exit of the area was seen by only 46.3% of the visitors, many of them simply glancing at it. It had almost no holding power. Since this quote carries the major burden for getting the message of this area across, these findings may help to account for the generally poor teaching power of the Toolmaker display.

The final section of Table 11 deals with the Message area. The 3 objects were given relatively short looks by about 61% of the visitors. Relatively few read the label material. Although there were no questions dealing specifically with this area in the test and questionnaire materials, it would be surprising, given the low attracting and holding power of the display, to find that the message of the Message area was being delivered to very many of the visitors. As noted earlier, this area was not intended to achieve very much, and in that sense it seems to be meeting its expectations very well indeed.

Location 8 is the acknowledgment and credit sign at the exhibit exit area. Thirty percent of the visitors still in the exhibit did notice this material, 7 of them reading at least part of it and 7 simply glancing at it.

More specific information on visitor behavior in the Sphere and Marsh areas of the exhibit is desirable due to the nature of their design and its impact on crowd flow and utilization. Both of these areas can be traversed in essentially two basic patterns, clockwise or counterclockwise. (Appendix A, pp. 14 and 15 shows these two areas in the general floor plan.) The Sphere area is further complicated by having two entrances, giving the

visitor four choices to make, i.e., right or left entrance and clockwise or counterclockwise movement through the display.

As noted earlier in this section of the report, most visitors in the observation study entered the Sphere on the right side (73%), and most of those people stayed on that side (77%), beginning what would be a counter-clockwise movement around the display. However, most visitors in this group did not complete that pattern, but rather exited from the right side into the entrance to the first theater. In order to describe this behavior in detail, the Sphere has been divided into 10 major stop areas, consisting of the 5 windows into the interior and the 5 specimen windows. Four of these major stops are on the right side (two interior windows and two specimen windows), four on the left side, and two at the "top" (or west side) of the Sphere. The following table shows how the 40 visitors who entered right and stayed right (counterclockwise movement) utilized the 10 major stops. (Glances are included in all of these computations.)

Table 12

Visitor Behavior in Sphere--Enter Right, Stay Right

N=40

Number of Possible Stops	Stops on Right Side (Maximum=4)		Stops on Left Side (Maximum=4)		Stops on Top (Maximum=2)	
	N	%	N	%	N	%
4	11	28	1	3	XXXXXXX	
3	13	33	0	0	XXXXXXX	
2	12	30	8	20	9	23
1	4	10	5	13	11	28
0	0	0	26	65	20	50

Clearly, the right entrance, right-sided visitor tended to stay on his "own side." Only 3% of them looked at all 4 areas on the left side, and 65% of them saw nothing on the left side. Also, 50% of these visitors did not look at either of the two elements of interest at the top of the Sphere. Even on their "own" side, only 28% of this group attended to all four of the elements, although none of them failed to at least glance at one of them.*

The pattern for those entering the left side and staying left is shown in the next table.

Table 13

Visitor Behavior in the Sphere--Enter Left, Stay Left

N=9

Number of Possible Stops	Stops on Right Side (Maximum=4)		Stops on Left Side (Maximum=4)		Stops on Top (Maximum=2)	
	N	%	N	%	N	%
4	0	0	2	22	XXXXXXX	
3	0	0	1	11	XXXXXXX	
2	1	11	4	44	6	66
1	2	22	2	22	1	11
0	6	66	0	0	2	22

Here the general trend is reversed, with almost the exact same percentage of left siders not seeing the right side as the percentage of right siders not seeing the left side. However, the number of left side visitors who saw at least one element at the top of the Sphere is (as would be expected) considerably greater than for the right side group (77% vs. 51%). Despite this fact, the two groups averaged the same number of stops in the Sphere (slightly over four per person).

*Five of the data sheets have been excluded from this analysis, two being uninterpretable and three indicating that the visitor walked through the Sphere area quickly without any evidence of having attended to it in any way.

The behavior of those who entered right and took a left or clockwise pattern is seen in Table 14.

Table 14
Visitor Behavior in the Sphere--Enter Right, Go Left
N=12

Number of Possible Stops	Stops on Right Side (Maximum=4)		Stops on Left Side (Maximum=4)		Stops on Top (Maximum=2)	
	N	%	N	%	N	%
4	0	0	3	25	XXXXXXX	
3	0	0	3	25	XXXXXXX	
2	7	58	4	33	2	16
1	5	42	1	8	8	67
0	0	0	1	8	2	16

This group has similarities to the left/left group, except that they have a higher percentage of "stops" on the right and slightly less on the left. This is largely because they tended to look at one or two elements on the right near the entrance before moving clockwise to the left side.

Finally, we have the other crossover group who entered left and went right. They are shown in Table 15.

Table 15
Visitor Behavior in the Sphere--Enter Left, Go Right
N=9

Number of Possible Stops	Stops on Right Side (Maximum=4)		Stops on Left Side (Maximum=4)		Stops on Top (Maximum=2)	
	N	%	N	%	N	%
4	4	44	3	33	XXXXXXX	
3	1	11	0	0	XXXXXXX	
2	4	44	4	44	3	33
1	0	0	2	22	2	22
0	0	0	0	0	4	44

This group tends to have a pattern similar to the other crossover pattern, with a fairly large number of them seeing at least two elements on the left before moving to the right side. However, their "top" viewing behavior is consistent with the right/right group.

In looking at all those who go right vs. left, it is interesting to note that the left group views a higher average number of elements (5.3) than the right group (4.4). This is largely accounted for by the higher utilization of the top area of the Sphere by the left group.

A summary of the overall utilization pattern of the Sphere, including the three walk-through visitors, is shown in Table 16.

Table 16
Overall Utilization Pattern for the Sphere

Number of Possible Stops or Looks	Number and % of Visitors Stopping	
10 (Max.)	1	1.4%
9	0	0
8	7	9.5%
7	5	6.7%
6	7	9.5%
5	13	17.5%
4	18	24.3%
3	8	10.8%
2	10	13.5%
1	2	2.7%
0 (walkthrough)	3	4.0%

While very few visitors look at all 10 major elements (only 1 out of the observed group), very few fail to at least look at 1 element, and the average is about 4.5 per person (out of 10).

It is very clear from this analysis of the Sphere that the visitors' flow pattern was directly influenced by the two entrances and the circular nature of the display itself. While, as noted earlier, it was not intended that "everyone look at everything" in this particular area, it is instructive to note for future reference the fact that most visitors will not circumnavigate a circular area when they are "placed" on one side or the other by a dual entrance and have an exit available other than the entrance.

The Marsh presents a slightly different pattern. While it shares with the Sphere the circumferential flow pattern and the separate exit, it has but one entrance, placing all visitors in the same "starting box," with two paths to take.

Of the 48 visitors in the observation study who went through the Marsh area, 39, or 81%, went to the right, only 8 (16%) to the left, and one person could not be categorized either way. The right bias found in the Sphere is still operative. How many crossed over from one side to the other? Since the exit is on the opposite side of the display from the entrance, the Marsh divides evenly into the right side (north and west faces of the square) and left side (east and south), with the same number of elements on the reading rail on each side (three per face; six per side). The following table compares the right group with the left group in terms of the number and percent of "stops" (including glances) out of the total possible for each of the two sides. Unfortunately, the left group is very small in number and is not likely to indicate the true left to right cross-over preference.

The results for the right group are consistent with the findings with respect to the Sphere, that is, approximately half of the visitors who went counterclockwise did not continue beyond the exit to the left side of the display. Those who did tended to view less of the left side than they did the right side. The average number of elements seen by the right group on the right side is four out of six; on the left side, 1.6 out of six.

Table 17

Visitor Behavior in the Marsh

Number of Possible Stops	Left Group (N=8) (Maximum=6)				Right Group (N=39) (Maximum=6)			
	Right Side		Left Side		Right Side		Left Side	
	N	%	N	%	N	%	N	%
6	1	12.5	0	0	10	26	3	8
5	0	0	2	25	5	13	3	8
4	3	37	1	12.5	6	15	2	5
3	1	12.5	1	12.5	8	20	6	15
2	1	12.5	1	12.5	6	15	0	0
1	2	25	0	0	2	5	6	15
0	0	0	3	37	2	5	19	49

The left group showed a different pattern. Of the eight persons who went left, three of them looked at none of the items on that side, and none of them looked at all six elements. In contrast, four of this group viewed four or more elements on the right side. In short, the left group averaged 2.3 elements out of six on the left side, but 3.1 on the right side. Although the number of people is too small to permit generalizations, it appears that the crossover "law" can be broken. It should be noted that the south side of the Marsh display is devoted to a description of the sulphur cycle and does not show the Marsh itself. It could be hypothesized that when visitors realized this, they continued around to the other side of the display to see more of this dramatic presentation.

The overall utilization pattern for the Marsh area is shown in Table 18. Only three visitors looked at all elements, and the average per visitor was 5.7. Only one visitor was able to walk through the area without looking at any of the elements. However, we can infer this individual's intentions by "looking" at her as visitor #56 in Table 9. She and her group "obviously" came to see the second film, where they spent 15 minutes and 35 seconds,

Table 18

Overall Utilization Pattern for the Marsh

Number of Stops or Looks	Number and % Stopping/Looking	
12 (Max.)	3	6.3%
11	1	2.1%
10	1	2.1%
9	4	8.3%
8	4	8.3%
7	2	4.2%
6	11	23.0%
5	4	8.3%
4	2	4.2%
3	8	16.7%
2	4	8.3%
1	3	6.3%
0 (Walkthrough)	1	2.1%

after which they exited from the entrance to the exhibit! Lawful visitor behavior will always be an aggregate of many, many individual behaviors. Knowing what any one person or group will do will forever be a mystery--and for this we should be thankful.

Conclusions

The Results section of this report has presented a wealth of data about the Man In His Environment exhibit. It has looked at a very complex set of stimulus materials (the exhibit,with all of its elements of design, objects, labels and messages), and an even more complex set of response potentials (the visitors, with all of their interests, attitudes, knowledges, motivations, and prejudices) and tried to show how one interacted with the

other in a way that can lead to a better understanding of the effectiveness of the exhibit. The small data "bits" are, perhaps, difficult to interpret in isolation, but taken in aggregates, they begin to show interrelationships. Models help form these aggregates since they provide a conceptual framework within which the individual pieces form defined patterns. Such a model that the author has found useful in other exhibit studies (and which has been essentially validated by other investigators, e.g., Robert A. Lakota, internal Smithsonian study, 1975), is the 3-factor model of exhibit effectiveness (Shettel, 1968). According to this model, an exhibit has three functions to serve in order to be considered effective: (1) an ability to attract visitors representative of the target audience, (2) an ability to hold those visitors long enough so that (3) it can convey its intended message to those visitors. These three functions are referred to respectively as *attracting power*, *holding power*, and *teaching power*.

The pre- post-data analysis represents a concern for the teaching power of MIHE, covering both knowledge and attitudes as they relate to the exhibition's goals and objectives. The observational study provides data on both attracting power and holding power. Within the limitations of the study, these data tell a "story" that represents a coherent overall picture of the "true" effectiveness of MIHE.

Specific recommendations for exhibit modifications based on the data and the general conclusions presented below are not made. Such suggestions for changes must be considered in the context of other factors (e.g., time and money) over which the author has no control, and about which he has no knowledge. However, requirements are identified in specific terms so that recommendations (if so desired) can be derived from them. (Naturally, the author would be more than willing to comment on such recommendations and could probably serve a useful purpose in doing so.) A requirement is defined as a statement of a deficiency, discontinuity or failure of an exhibit characteristic, objective, element or elements, based on data from the study and, to the extent possible, stated in terms of some defined criteria of effectiveness.

Looking first at the overall attracting power of MIHE, it is clear from the analysis of demographic data that the exhibit is attracting, as was intended, a highly educated group of white visitors, most of them from high energy-consuming suburbia and from out-of-town areas. However, on the assumption that the desired target audience should also include a larger percentage of typical residents of the Chicago area 16 years of age and up, one could state a defined discrepancy between goal and achievement at least at the time of the study. Numbers of visitors per se are not a subject of concern since no objectives were stated against which to judge attendance figures.

Turning to teaching power for a moment, it is clear from the general trends of the pre- and post-data that education is positively related to both prior knowledge and attitudes in the subject matter area, and, to some extent, to the ability to learn new knowledge from the exhibit itself. Thus, one could say that the exhibit is tending to reach those who already have some of the knowledge and attitudes the exhibit is designed to impart, and to be a better teaching "device" for the better educated group than for the less educated. One could thus say that the exhibit needs to do a better job of conveying its defined messages to those who have a knowledge deficit and who also tend to be less well educated (and who also tend not to be in the visitor population). On the basis of this analysis, the overall impact of the exhibit on the community could be dramatically increased by the achievement of two things:

1. bring to the exhibit a greater number of people who lack knowledge of the subject matter, (i.e., inner-city, lower income, ethnically mixed), and
2. more effectively conveying to them (attracting, holding and communicating) the intended information and attitudes.

General holding power within the exhibit itself is generally less than optimal. This is admittedly a judgment, but a 36% attrition rate from the exhibit seems unnecessarily high. The requirement generated from this finding would relate to ways that would make it less likely that anyone

would leave the exhibit "early" because he or she did not know that there was more to see. The subject of visitor orientation to museums and exhibits and the use of advanced organizing systems to help people plan their visits more rationally is one that has received considerable attention recently, and has been shown to be capable of exerting some influence on subsequent visitor behavior. Thus, areas of special concern, such as the first theater, where most of the "dropouts" originated, would be excellent candidates for special attention in connection with these concepts. Naturally, the two entrance areas would also lend themselves to further analysis in terms of visitor orientation. (There is considerable data that suggests that abstractions are less interpretable by the average person than more literal representation of reality. These findings may be considered relevant in the context of the exhibit layout shown at the two entrance areas.) The taped orientation message should also be carefully analyzed in this connection.

Holding power within specific areas of the exhibit was seen to be a special problem for both the Marsh and the Message areas. The Marsh was a problem primarily because of its high information loading relative to the average time spent in it. Raising the ratio of actual time to required time for the Marsh would represent a significant increase in the <u>opportunity</u> to convey factual information on the environment and to reinforce the points made in the first film. This requirement necessarily interacts with the teaching power of the Marsh. Finding ways to increase time spent (holding power) is of importance <u>only</u> if the time is spent productively, i.e., if it leads to an increase in the achievement of whatever the instructional and/or attitudinal purposes of the display might be. Since performance on the informational item having to do with energy loss in the food chain was generally poor, but especially so for the lower educational levels, one might want to single out this subject matter area for special attention in considering ways to increase the overall effectiveness of the Marsh.

The Message area presents a rather different picture. Its low holding power is largely intentional, and is a result of its <u>small</u> information loading <u>and</u> the even smaller amount of time spent looking at what is there.

For the vast majority of visitors, this area is extremely low in all three exhibit functions and in that sense represents the least effective of the six main areas of MIHE. It is essentially used as a "way of getting out" of the exhibit and this is the function it was primarily intended to serve. However, it could serve a more significant function, one that would represent an impactful and relevant concluding statement, one that visitors would attend to and understand.

Two rather serious problems in the teaching power of MIHE have to do with the Toolmaker area (including the sculpture) and the notion of personal commitment to change, (or at least an awareness of alternatives to our present social and economic institutions). The latter message was largely the responsibility of the second film. The requirements in both of these cases must relate to the need to make these messages more explicit and understandable to the target audience. Reading level, conceptual clarity, repetition, and active participation, are all techniques used to ensure high levels of understanding and learning, and represent useful notions to consider in the upgrading of these important areas and objectives of the exhibit. In fact, since the Message area is shown to have little purpose, and since the "personal commitment to change" message is not being effectively conveyed to many visitors, one could possibly see a blending of these two requirements into one.

At a more generalized level, one must go back to the fundamental question raised early in the report, "Do those who visit the exhibit experience a significant change in their knowledge of, and/or attitudes toward, the environment and man's role in that environment, such change being consistent with the goals and objectives as defined by those responsible for the exhibit?" In this connection, the overall teaching power of the exhibit, as defined by the scores on the pre/post written items, is not very high. Considering that the questions were on basic, main ideas rather than on detailed subobjectives (of which there were many), the average pretest score of 11.5 out of 25 (46% entry knowledge) and posttest score of 12.5 (50% exit

knowledge) gives the didactic aspects of the exhibit a low teaching power of 7%.* There are, unfortunately, no standards against which to relate such a finding, although the author's experience would suggest that such a result is at least typical of, if not actually better than, that found for many didactic exhibits.

But it is not the average performance of exhibits in general that is of concern here; it is the potential of MIHE to achieve much more of its critical mission than it does that should be the motivation behind the willingness to evaluate and the desire to make changes based on that evaluation.

Finally, it must be noted that the vast majority (80%) of the 157 visitors to MIHE who were interviewed left the exhibit feeling that their time had been well spent. The two films in general, and the second one in particular, were shown to be extremely effective in holding the attention of viewers. The Marsh was an outstanding attraction to many viewers, especially those at the higher educational levels. Furthermore, the essential message of MIHE is understood, albeit for the most part in a rather simplistic way, by 80% of the visitors in the sample. These are impressive findings, ones that show a high degree of skill in conceptualizing and designing an exhibit that has a complex and unpleasant (even frightening) message to deliver. That this message could be delivered more effectively to more people is the basic conclusion of this study. Specific requirements were identified by means of which such positive changes could be made. That such changes will be made is an issue that must be addressed by others within the context of their own needs, priorities and resources.

*The exhibit had the potential to raise the pretest score 54%--from 46% to 100%. It actually raised it 4%, or 7% of its potential gain.

References

Lakota, R. A. The National Museum of Natural History as a behavioral environment. Final Report. Washington, D. C.: Smithsonian Institution, Office of Museum Programs, March 1975.

Shettel, H. H. Strategies for determining exhibit effectiveness. Final Report. Pittsburgh, Penna.: American Institutes for Research, April 1968.

APPENDIX A

Posttest Interview Items A-1
Answers to Interview Items A-2
Scoring Key--Open-Ended Questions A-4
Questionnaire A-5
Demographic Items A-9
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Marsh Observation Form A-15
Toolmaker Observation Form A-16
Message Observation Form A-17

Posttest Interview Items

(Ask permission to write their comments down and tell them there are no right or wrong answers--"what we want is your own opinion and reactions.")

1. What was your overall reaction to the exhibit you just saw?

2. Tell me what you think the basic message of the exhibit was?

3. Is there anything you personally feel you will do as a result of seeing the exhibit? (Probe to get specifics to the extent possible.)

4. What was the main point of the first film you saw--the one about nature?

5. What was the main point of the second film you saw?

6. Did you see this sculpture?
   What was its Message?

7. Did you see the two plows?
   What do you think the idea was in showing these two plows?

8. Did you see this statement in the exhibit anywhere? (Hand person Paton quote: "Keep it, guard it, care for it, for it keeps men, guards men, cares for men. Destroy it and man is destroyed.")

   What does the statement mean to you?

9. Was there one special thing or part of the exhibit that you found particularly interesting? (Probe for reasons if answered affirmatively.)

10. Was there anything that you didn't like or understand? (Probe) What did you like least? (Probe)

END OF INTERVIEW
GO TO WRITTEN TEST

Answers to Interview Items

Use as much room as needed but try to write only the essential points. The initial response made to a question is the most important and should be recorded verbatim or nearly so. Write legibly--someone else is going to read what you write.

1. _____

_____

_____

2. _____

_____

_____

3. _____

_____

_____

4. _____

_____

_____

5. _____

_____

_____

6. ☐ Yes _____

_____

☐ No _____

_____

7. ☐ Yes _____

☐ No _____

8. ☐ Yes _____

☐ No _____

9. _____

10. _____

General Comments _____

Interviewer's initials: _____

SCORING KEY--OPEN-ENDED QUESTIONS

1. 5 = very positive, supportive, impressed
   4 = positive
   3 = neutral
   2 = negative
   1 = very negative

2. 5 = got basic message very well: noted a number of points
   4 = got basic message essence
   3 = was unable to say or content only
   2 = seemed to miss the point
   1 = got the wrong basic message

3. 3 = noted 2 or more things
   2 = noted 1 thing
   1 = noted nothing or vague

3a. = already doing something

4. & 5. 5 = got basic message very well and/or noted more than 1 point
   4 = got essence or noted 1 point
   3 = unable to say or vague
   2 = missed point somewhat
   1 = missed point badly
   0 = missed film

6. Yes: 3 = got basic message
   2 = did not know or vague
   1 = got wrong message

   No: 0

7. Yes: 3 = got basic message
   2 = did not know or vague
   1 = got wrong message

   No: 0

8. Yes: 3 = got basic message
   2 = did not know or vague
   1 = got wrong message

   No: 0

9. a. Everything
   b. Sphere of Life
   c. 1st film
   d. marsh
   e. tool maker
   f. 2nd film
   g. message
   h. the Paton quote
   j. nothing in particular

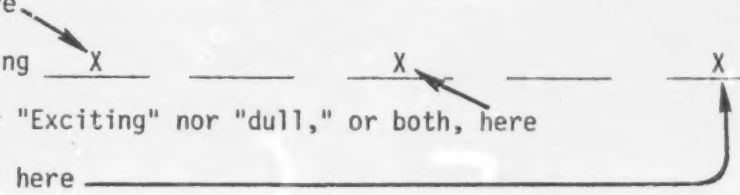
10. a. No answer/like everything
   b. Sphere of Life
   c. 1st film
   d. marsh
   e. tool maker
   f. 2nd film
   g. message
   h. Miscellaneous

General Comments:

☐ Pre
☐ Post

Questionnaire

How do you feel about the natural world we live in? The form below will allow you to express your feelings about this subject. Here's an example of how to do it. If you would think of NATURE as "exciting" you would put a mark here.



If neither "Exciting" nor "dull," or both, here

If "dull," here

"Somewhat exciting" or "somewhat dull" would be indicated by marking either of the other spaces.

Now, do this for the ideas about nature shown below. Put down only one mark for each idea.

I think of NATURE as:

Living	____	____	____	____	____	Dead
Complex	____	____	____	____	____	Simple
Not valuable	____	____	____	____	____	Valuable
Beautiful	____	____	____	____	____	Ugly
Orderly	____	____	____	____	____	Disorderly
Unimportant	____	____	____	____	____	Important
Limited	____	____	____	____	____	Unlimited

The statements given below reflect a variety of positions on important issues, and we would like to get your own personal feelings and reactions to them. There are no right or wrong answers--this is not a "test." Simply select the statement that best reflects your own feelings and opinions by putting an X in one box. Don't go back to change any of your Xs. Your first reactions are the ones we want! If you don't understand the statement or any of the words used in the statement, ask for help.

1. We can continue, for many years to come, to use the earth's natural resources the way we have without running into a serious problem.

☐ Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree

2. Questions and issues relating to ecology and the environment are too complicated for the average person to understand.

☐ Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree

3. Economic growth and the production of material goods and wealth are the best indication of our country's "health," and they will continue to be so in the forseeable future.

☐ Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree

4. Human population growth is not really a serious problem. There will be plenty of food and other resources to meet the needs of future generations, however large they may be.

☐ Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree

5. Man has learned to control and manipulate nature; nature does not have a similarly strong influence on what man can do.

☐ Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree

6. It is very likely that we will have to change our way of life in the U. S. in my lifetime.

☐ Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree

7. The amount of food and minerals available to support life on earth is actually unlimited since nature has developed complex systems for producing new sources of these things.

☐ Agree ☐ Disagree

8. Energy from the sun is never lost since it is converted to food and then passes from one organism to another through a cycle of eating and being eaten.

☐ Agree ☐ Disagree

9. A given habitat in nature (like a forest) can support almost unlimited numbers of living things because of the constant cycling of food and minerals.

☐ Agree ☐ Disagree

10. Man, through his superior intellect, has learned to improve on nature itself--he can grow bigger tomatoes, produce more food per acre, control pests, keep food from spoiling, etc., etc. This ability to manipulate the natural world to help mankind is improving day by day and is one of man's supreme accomplishments.

☐ Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree

11. The essential ingredients for life to exist on earth are:

☐ water and green plants
☐ dead matter and live matter
☐ plants and animals
☐ energy from the sun, mineral nutrients, and water

12. The term "food chain" refers to:

☐ the way an animal can make use of a variety of different kinds of food
☐ the way nutrients are passed along from one living thing to another through a cycle of eating and being eaten
☐ the way plants can transform the sun's energy into food for animals
☐ the way dead matter is broken down by bacteria into food for larger animals.

13. As man's technological skills have increased over the centuries, man's energy requirements have actually decreased.

☐ Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree

14. A huge and healthy wheat field in Kansas is a good example of nature at its best.

☐ Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree

15. A referendum is coming up in your community that asks you to vote on a transfer of funds from a new highway project to an improved transit system. Both the highway and the public transit line would serve your area. You have a car and drive to work on an old and inadequate road. How would you vote?

☐ Transfer the funds to transit.

☐ Don't transfer the funds and build the highway.

16. The mayor of your small but prosperous community wants to launch a public relations program designed to attract more heavy industry to the area so that more jobs are available and the community can grow. A group of people are against this effort since the city has no pollution control laws and new heavy industry would be a source of air and water pollution for years to come. The local newspaper says "Nonsense--we need to grow now, to bring in new money and thus stimulate the entire community." One of the people opposing the mayor's action comes to your house and asks you to sign a petition. This petition would be sent to the city government asking them to delay the mayor's program until a study is done on the effects of heavy industry on the environment. Would you sign this petition?

☐ Yes ☐ No

☐ Pre C-1

☐ Post

Demographic Items

(Given at end of pretest and posttest.)

One more thing. We would like to get a few facts about you so that we can relate your answers to those of other people we will be interviewing.

1. Education (highest level)

☐ Elementary
☐ High School (some)
☐ High School (completed)

Major area of study: _____

☐ College (some)
☐ College, B.A.
☐ College, M.A.
☐ College, Ph.D. & above

2. Special training or course work in natural history, environmental/ ecological concerns, (e.g., pollution, population), biology?

☐ No ☐ Yes

What: _____
When: _____
Where: _____

3. Present occupation: _____

4. Where do you live:

☐ Chicago
☐ Chicago suburbs
☐ Other: _____

5. Are you here:
   - ☐ Alone
   - ☐ With family (#_____)
   - ☐ With friends (#_____)

6. Why did you come to this exhibit: (Read Answers)

   Have you been to this exhibit before? ☐ Yes ☐ No

   - ☐ You just happened to see it in passing.
   - ☐ You saw it announced as you came in the museum.
   - ☐ You read about it somewhere:_____.
   - ☐ You saw it on television.
   - ☐ A friend told you about it.

7. Age: _____

8. ☐ Male
   ☐ Female

9. Ethnicity: ☐ White ☐ Black ☐ Spanish-Speaking
   ☐ Other:_____

10. (Posttest only) How long in exhibit? _____

Day of week_____

Time of day _____

(Posttest only) Visitor Density:
- ☐ very crowded
- ☐ fairly crowded
- ☐ not very crowded

Interviewer's initials: _____

ATTACH TO PRE OR POST
QUESTIONNAIRE FORM

Observation Study Form

Demographic Data

The following information must be recorded for each person observed, whether static observation or moving observation:

1. ☐ Male ☐ Female

2. Age estimate:

   ☐ 16-20 ☐ 21-30 ☐ 31-50 ☐ 50+

3. Ethnicity:

   ☐ White ☐ Black ☐ Spanish-speaking ☐ Oriental

4. ☐ Single visitor

   ☐ With family (#_____)

   ☐ With friends (#_____)

5. Condition of exhibit area:

   ☐ Very crowded ☐ Fairly crowded ☐ Not very crowded

6. Time of day:

   ☐ AM ☐ PM (till 5:00) ☐ Evening (after 5:00)

7. Day of week: _____

8. Did person know he was being observed?

   ☐ Yes _____

   ☐ No _____

   ☐ Maybe _____

ATTACH TO OBSERVATION FORM

Observer's initials: _____

Refusal Form

(Tally next to each category)

Male:_____

Female:_____

Young: (16 - 20)_____

Young adult: (21 - 30)_____

Adult: (31 - 50)_____

Older Adult: (51 & up)_____

With group:_____

Alone:_____

Day of week: Monday_____ Tuesday_____

Wednesday_____ Thursday_____

Friday_____ Saturday_____

Sunday_____

Time of day: A.M._____

P.M. (until 5:00)_____

Evening_____

If reason given, write down:_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(continue on back)

Interviewer's initials: _____

Obtaining the Sample and Testing Procedures

1. When crowded: A spot on the floor is used to select interviewees. When person steps on spot, approach for an interview. Exception: Children who appear to be under the age of 16. If in doubt, ask age.

   When not crowded: Select the nth person who approaches or leaves the exhibit. (Every third, fourth, etc. You will be told what number to use.)

2. Your museum badge should be visible.

3. Say something like: Hello. I'm a member of the staff here at the museum; we want to learn more about the people who come to see us. I have a few questions I would like to ask you--it will take about 15 minutes, and for those who agree to participate, we have a small gift showing our appreciation.

   (If refused, fill out Refusal Form. If accepted, go on.)

   Fine. Come with me where we can sit down.

   If interviewee is part of a group, ask the others to please wait "outside" the testing area.

4. POST ONLY: Ask permission to write down answers to oral questions. If refused, explain why it is necessary, let them choose gift and terminate interview.

5. PRE & POST: Hand person Questionnaire and a pencil.

   Say: Please complete this form for us. If you don't understand the instructions, or some of the words used in it, don't hesitate to ask me for help.

6. Monitor progress. If taking too long, ask if person needs help.

7. When finished, complete Demographic Data Form and attach Questionnaire.

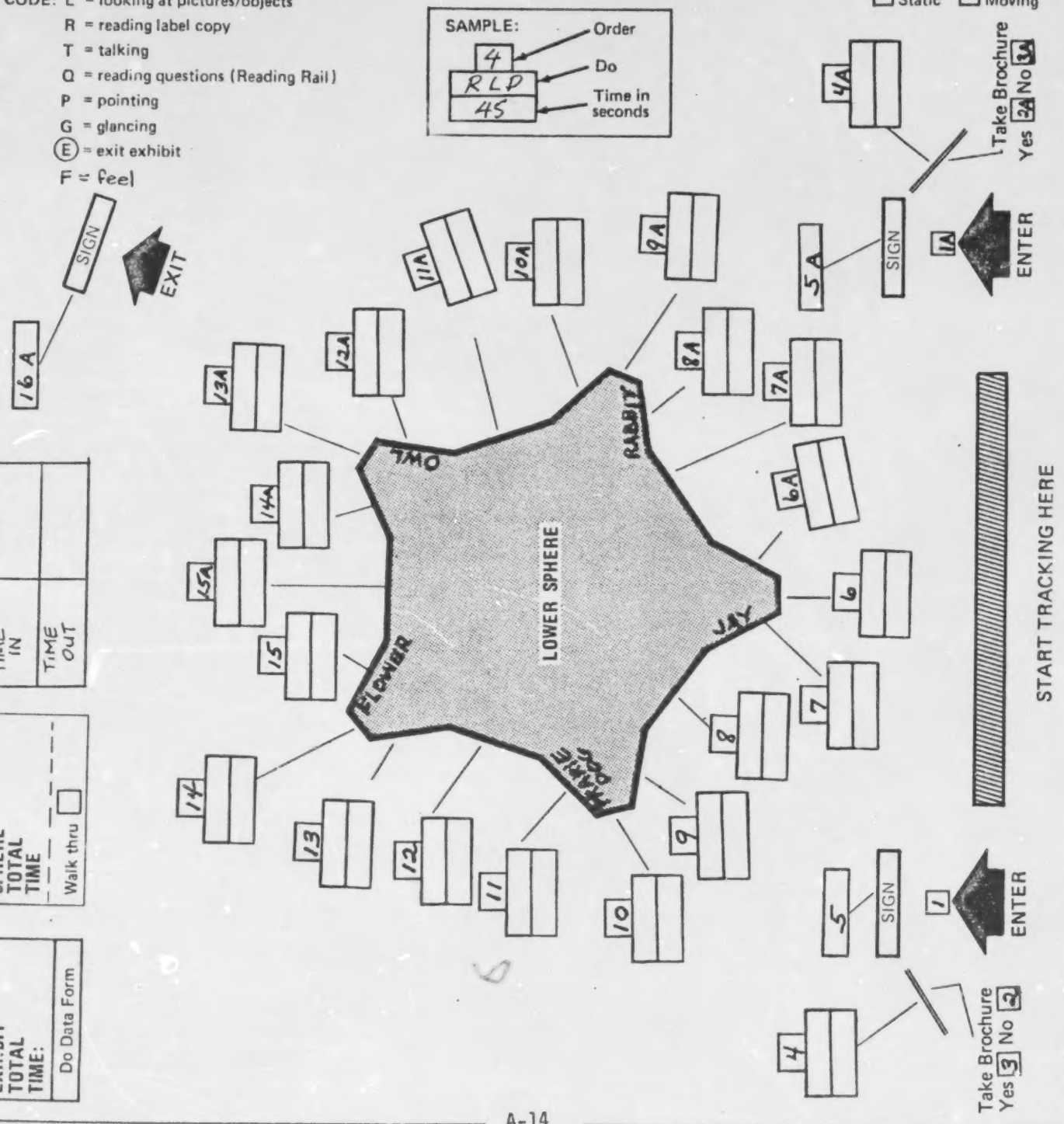
8. Let person select gift and thank herm for herm cooperation.

sphere of life	OBSERVATION FORM NO. ONE

CODE: L = looking at pictures/objects
R = reading label copy
T = talking
Q = reading questions (Reading Rail)
P = pointing
G = glancing
(E) = exit exhibit
F = feel

☐ Static ☐ Moving

SAMPLE: 4 / RLP / 45 — Order / Do / Time in seconds



TIME IN	
TIME OUT	

78

theater no. 1

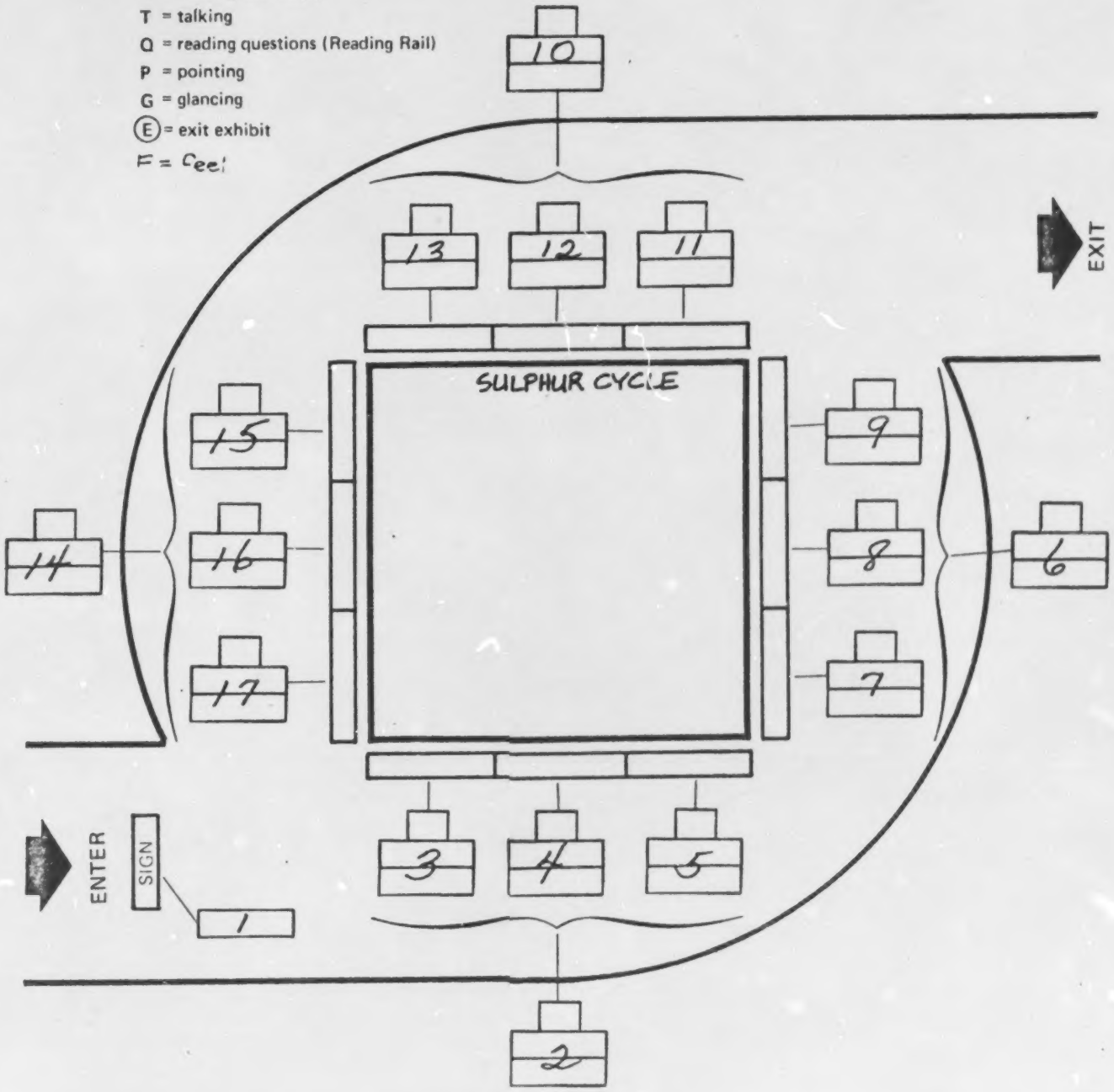
THEATER TOTAL TIME:
Walk thru ☐

EXHIBIT TOTAL TIME:
Do Data Form

marsh	OBSERVATION FORM NO. TWO

☐ Static ☐ Moving

CODE: L = looking at pictures/objects
R = reading label copy
T = talking
Q = reading questions (Reading Rail)
P = pointing
G = glancing
(E) = exit exhibit
F = Feel



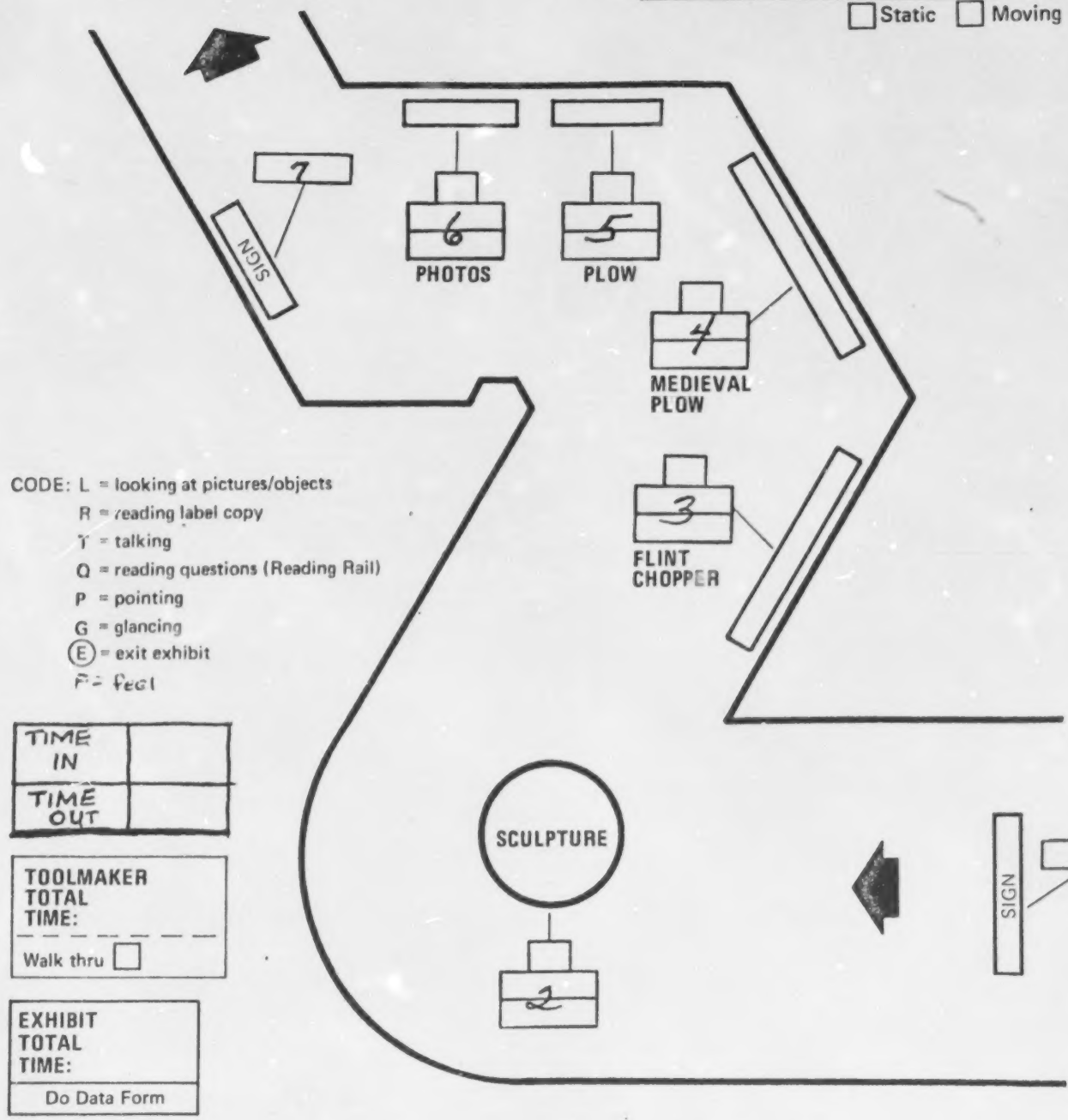
TIME IN	
TIME OUT	

MARSH TOTAL TIME:
Walk thru ☐

EXHIBIT TOTAL TIME:
Do Data Form

toolmaker	OBSERVATION FORM NO. THREE

☐ Static ☐ Moving



CODE: L = looking at pictures/objects
R = reading label copy
T = talking
Q = reading questions (Reading Rail)
P = pointing
G = glancing
(E) = exit exhibit
F = feel

TIME IN	
TIME OUT	

TOOLMAKER TOTAL TIME:
Walk thru ☐

EXHIBIT TOTAL TIME:
Do Data Form

TIME IN	
TIME OUT	

theater no. 2

THEATER TOTAL TIME:
Walk thru ☐

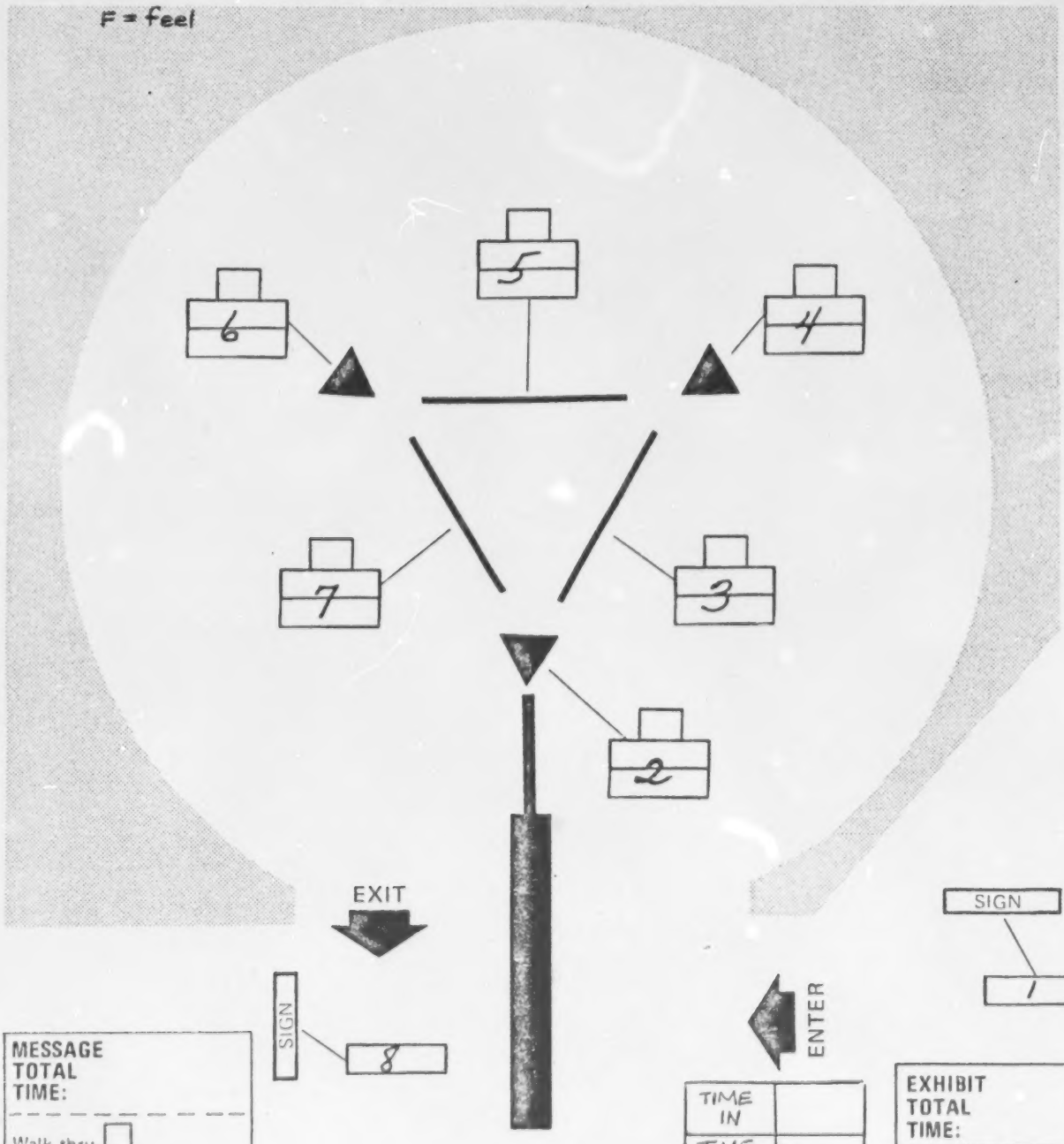
EXHIBIT TOTAL TIME:
Do Data Form

80

message	OBSERVATION FORM NO. FOUR

☐ Static ☐ Moving

CODE:
- L = looking at pictures/objects
- R = reading label copy
- T = talking
- Q = reading questions (Reading Rail)
- P = pointing
- G = glancing
- (E) = exit exhibit
- F = feel



APPENDIX B

Selected Responses to Oral Interview Items

APPENDIX B

Selected Responses to Oral Interview Items

1. What was your overall reaction to the exhibit you just saw?

Ph.D.

Immense; brings some really vital stuff together; incredible. Wish more focus on Illinois ecosystems rather than Georgia marsh--perhaps a Lake Michigan marsh; divorcing individual from problems by having situation far away; relate it more to immediate environment; problem may be, needs more research to relate it. 39-M-Y*

MA

Excellent, well done--technically shows money well spent. Movies have good narration and photography. 33-M-Y

Impressed; liked presentation. Not overly biased in any direction. 33-M-N
(The variety of responses to same stimulus is fascinating.)

BA

Really good. Didn't bother me that it was making an ethical statement even though the museum usually doesn't. 26-F-Y

Very good--contrast to Museum of Science and Industry with its emphasis on "produce, produce." 22-F-Y

Public needs to see this subject presented. The way it was displayed was strange--more film and less exhibit than she expected. 30-F-N

It was a waste of space--very bad use of space economically. 35-F-Y
(Has designed exhibits.)

Not very informative; not much content; content doesn't match package. 33-M-Y

*Key:

The first two digits indicate the age of respondent.
Middle letters (M or F) indicate the sex of respondent.
End letter "Y" means that individual had some exposure to environmental training or education.
End letter "N" indicates no such exposure.

Some College

Worthwhile to see--more visual display to reinforce what's shown in movie (except marsh after first film); not much after second film; not as much reinforcement. Second film more important. 21-M-N

Films exquisitely photographed. 26-F-Y

Liked the different approach--multi-media was refreshing change from other traditional exhibits. 19-M-N

Completed High School

No reaction--didn't care for it--only saw part of the movie. (A rare "one.") 34-M-N

2. Tell me what you think the basic message of the exhibit was?

Ph.D.

Disparity between our country and others in world. (The only low score so far and from a Ph.D.! A librarian.) 56-F-N

A little too preachy--especially films; as former teacher, never would have done it that way; message excellent. 73-F-Y

Resources establish population limits and we have to make choices. 39-M-Y

BA

The message was anti-technological, against population growth. Progress of civilization, mankind. 24-M-N

Some College

We can wipe ourselves out really easily. 18-M-Y

Take care of earth. (Example of a very weak "4.") 26-F-Y

Man is part of the world and can't go beyond the means given by the world (i.e., must recognize limitations). (Example of a "5.") 41-M-N

Better start changing the earth or you won't have anyone left. 29-F-N

Turn people on to the environment and problems we have with it, and the alternatives. (A good 5--mentioned alternatives!) 20-M-N

Completed High School

It was there to entertain, to tell about life and nature. 23-F-N

Some High School

To tell people we must act to preserve our world. (Not very elegant--but a 16-year old's way of saying what the basic message is.) 16-F-Y

We need "0" population growth. 16-M-N

3. Is there anything you personally feel you will do as a result of seeing the exhibit? (Probe to get specifics to the extent possible.)

Ph.D.

One thing I use films for teaching. (He's involved in this field.) 39-M-Y

MA

Difficult for one individual to resolve to change anything. Left with a feeling of hopelessness. Only way to improvement would be collectively organizing through citizen action. 33-M-Y

Can't think of anything off-hand. (A very common "1" response.) 37-F-Y

BA

Not go through it (exhibit) again. (Wise guy.) 24-M-N

No--already aware of the problem--getting tired of hearing same message. 35-F-Y

Some College

No. Not much that I can do. Will recommend exhibit. 26-M-Y

Completed High School

Probably forget about it. Get caught up in regular life (getting job, etc.,). Everyday life not conducive to this kind of thing, need to work for self today. 16-F-Y

Conservation minded; will take all steps presented but don't believe two individuals can save world. 52-M-N

No, I wouldn't do anything. 23-F-N

Yes--mental note: used to recycle aluminum cans and glass, stopped, now will start again. 33-F-N

4. What was the main point of the first film you saw--the one about nature?

Ph.D.

Food chain--decreasing amount of energy available to each level in food chain. 39-M-Y

5. What was the main point of the second film you saw?

Ph.D.

To educate us on the history of man's involvement in nature. (One of few who missed point.) 34-M-N

Relates to item 4: problem of decreasing bio-energy, if you introduce technological energy (DDT) etc., thus increasing concentrations in nature. 39-M-Y

MA

"Americans are gluttons of the world . . . and we don't share." 37-M-N
(This is the second one of these. A hard one to score. But it is off the mark.)

BA

Racist and biased opinion of population growth. In first case: Caucasian family with five generations, then showed third world cultures (Africa) to be controlled. Classroom scene was unrealistic; only five students; must have been private school--had one token middle-class Black student. 25-F-Y Black

Some College

Did not see second film; was distracted by children making noise. 26-M-N

There are other means of preventing damage rather than pollution. 38-F-Y
(Example of a 3.)

6. Did you see this sculpture? What was its message?

Ph.D.

Man is a predator but one step beyond animals (tool). 26-F-Y
(A Ph.D. got it.)

Man is an animal; man has no greater stature in scheme than any other animal. (A Ph.D. didn't get it.) 32-M-N

Passed by because didn't indicate anything new to use in teaching. Thing most people know is that man is fundamentally a predator, but, in teaching, that is something many students already believe; doesn't force them to change their thinking. In a way, makes second film unnecessary. Sculpture wouldn't verify film if man was a predator in same sense. 39-M-Y

MA

Makes you wonder if man is any different from animals. Also, shows how gluttonous man is. (Why isn't the lion "gluttonous?" The display can reinforce such simplistic thinking.) 37-M-N

Real nice; ambiguous; we're not that far away from the rest of the animals. They have teeth, we have rocks; both coming from same place. Spreads out from teeth, rock, etc. (A nice statement that captures the essence and gets a 3. Yet, he still missed the plow message.) 25-M-N

BA

Man used tools to accomplish a task similar to animals. Man is different from rest of animal kingdom in that he uses his brain power more than physical power. 44-M-N

Two people doing the same thing. (People?) 27-M-Y

Some College

Turned her off (as a vegetarian) as the way man treats animals: way lion is acting is natural; man is using a tool (to kill) isn't as natural. (An interesting twist. Noted tool, but in a negative way.) 23-F-N

Demonstrates beast in man. 26-F-Y

Man's instinct (survival). Man has progressed beyond animals. 26-M-Y

Evolution; early predators vs. humans with tools. (A difficult one--but probably a 3.) 19-M-Y

Man on same level as animal--have we progressed? (So many ways of stating wrong message.) 20-M-Y

We're similar to animals; both meat eaters; kill for food; we're not as superior to them as we all think. 24-F-N

Completed High School

Struggle for survival--couldn't figure it out. 42-M-N

That man uses tools, while animals use what nature gave them; man has intelligence to make and use tools. (Does it make him a higher being?) (His question. Not bad for a 55-year-old high school graduate.) 55-M-N

Some High School

"Tools; man, the toolmaker." Man's superiority to animals. (He got it!) 57-M-N

7. Did you see the two plows? What do you think the idea was in showing these two plows?

Ph.D.

Time marches on--shows evolution of science (related to the sculpture which shows evolution of humanity). (Interesting that he saw an analogy and that it was misleading.) 34-M-N

As civilization develops, we find technological energy used more and more, technological interdependence; what it doesn't show, fallacy, room with marsh to plow production--link isn't clear enough. Whole social dimension not shockingly presented enough, not showing social relationship to nature. 39-M-Y

Increase of technology. (Another Ph.D. missed it.) 26-F-Y

BA

Now, we're industrialized; we can do more, but also are more dependent on more raw materials and other parts that keep a plow working. There is increased production, but photos show how much more resources needed to build a plow. (A winner!) 24-F-Y

Didn't see how they connected, one to the other, or to rest of entire exhibit. Possibly meant to show historical development. 22-M-Y

To show how man has used his knowledge to make things more efficient, second plow being more efficient. (Typical of those who missed.) 27-M-N

Saw old one and focused on that. Did not see modern plow--had expected a more involved section on tool development. (Many missed modern plow.) 47-M-N

Some College

Shows modernization of tool-making, from very simple to complex. 33-M-Y

"Humans needed to drive old plows." Much energy needed for new one. 26-M-Y

Don't know, didn't seem to fit in. 18-M-Y

How little it took to make first plow and how complex society is today. What goes into making the second plow. 19-F-Y

Show how productivity has increased by men's innovations. 21-M-N

Show how far we have progressed. (Very typical!) 38-F-Y

No--only saw one on the wall. (A common statement.) 20-M-N

Contrast in styles; to ask ourselves a question--which is the better plow. (Another rare one.) 18-M-Y

Placed after sculpture--to show progress--question this after movie. (How misleading can you get! This is beautiful.) 20-M-Y

Completed High School

We're growing awful fast--dangerously fast. 17-M-Y

At first I didn't see that plow--thought it was upside down. 23-F-N

8. Did you see this statement in the exhibit anywhere? (Hand person Paton quote: "Keep it, guard it, care for it, for it keeps men, guards men, cares for men. Destroy it and man is destroyed.") What does the statement mean to you?

Ph.D.

Different levels: 1st, stewardship of the earth; 2nd level, implicit; next level, mystic--As ecologist, one could say earth "keeps . . ." etc. may be too anthropocentric. Still places us at center of it; that's the meaning taken to really deal with it; hinting at in Message room; some cultures have lived in balance with nature; not through social systems, but mystical and religious systems; not in near future, but it will evolve in our culture to make idea of statement really work. 39-M-Y

9. Was there one special thing or part of the exhibit that you found particularly interesting? (Probe for reasons if answered affirmatively.)

Ph.D.

Salt marsh--very intricate, detailed, fine craftsmanship. Also, liked the films--especially that they were continuous and segmented so viewers can come and leave at will. 34-M-N

Salt marsh--had basic info, questions, exhibit in center; looked up, down, etc.; good interactive process. 39-M-Y

BA

Marsh; very educational. Liked to answer questions on the reading rail. 31-F-N

Salt marsh reinforced many of the statements made in first film. Very informative/educational. But value of it is best only because it followed film. Wouldn't have meant as much without first film as background. 26-F-N

Sculpture. 22-M-Y

Salt marsh--had interesting reading rail which related to the very effective model. 30-F-N

Some College

Life cycle; sphere of life. Liked questions and answers. 29-F-N

Salt marsh, unexpected, didn't know sulphur cycle was related to salt marsh. (Somebody got something out of the sulphur cycle!) 21-F-Y

The sculpture; way man and lion represent two different things and yet they are together. 20-M-N

Completed High School

Whole exhibit was spectacular--nothing specifically; should be kept up permanently. 35-F-N

Brochures good. 33-F-N

10. Was there anything that you didn't like or understand? (Probe) What did you like least? (Probe)

Ph.D.

Too simplistic; too idealistic, short-sighted solutions. 38-M-Y

Sulphur cycle was new to him, good to see, never had a real course in ecology; feeling most of it out. Understands lot of social systems (plow room) but thinks that exhibit doesn't lead to social basis of that room. Of the films, only one gets you to think about social institutions. Of schooling: seeing kids asking questions in film, much too weak, almost voided. So, why not use film time to say how many kids should a woman have rather than could have. Relationships were presented. Happy to hear part about U. S. using the most resources, more than they need--comes back to sculpture. As image: says people are predators, strong enough image at end to help people work with nature rather than function as predators. 39-M-Y

MA

Sulphur cycle, bacteria. Didn't like message; wasn't dramatic enough. (Several have noted this as week and/or not very interesting. Most people ignore it.) 43-M-N

Excessive editorializing in films and whole thing too message-oriented. 34-M-Y

Message from cultures could have been expanded. Seemed a let-down after impact of second film. 33-M-Y

Brevity; lack of more illustrative material; didn't like dark tunnels. 47-M-N

Glass case in first room (Sphere of Life)--not sure it tied in to everything, in particular to him; seemed disjointed to the rest of the exhibit. (This was often said of the plows, not too often about sphere.) 63-M-Y

The "messages from other cultures" should have been more explicit. (A real "trend" in this direction.) 37-M-N

BA

Didn't give guidelines on specific actions each person can do--doesn't succeed in leaving public with a concrete sense of commitment. 26-F-N

Actual flint instead of plastic; flint is cold; rather than warm like plastic. 36-F-Y

Messages from other cultures--it had all been said before--a waste of space in the exhibit. 57-F-N

Messages from other cultures lacks information and continuity with rest of exhibit. 22-M-Y

Salt marsh--too artificial. "My 4-year old could tell that the water was artificial . . ." (Only negative so far. Some people are never satisfied.) 32-F-N

She was quite willing to participate, and interested in the idea behind the exhibit. But she was clearly disturbed and annoyed by second film. She said that by showing third world countries as poor and hungry, it implied that they were the ones whose population would be controlled first. She noted that as the film shows the economics of Africa, the poor needed more family members to survive. 28-F-Y Black

BA (continued)

Films not good quality--seemed blurred; seats uncomfortable. "Messages from cultures"--almost missed it, "didn't get the message." Plows--what was the point of their being there at all? 30-F-N

Films--audio visual crap is waste of time and space. 35-F-Y

Steps in theater need better lighting. (Can trip getting to your seat.) 38-F-Y

Museum needs to sell itself more--need more advertising that the exhibit is here. Seems to attract those already aware of environment problems; must work on drawing the unaware public. (Good point.) 44-M-N

Some College

Chairs are uncomfortable in theaters. 18-F-Y

Museum could add some info on practical guidelines on what each individual can actually do to remedy our situation. 19-F-Y

Second film was spliced poorly, skipped a section and cut into a new, unrelated scene; made him lose interest. 21-M-N

Portion of film that advocated ZPG was distasteful to him. 41-M-N

Sphere of life--confusing--"too much is going on at once." 20-F-Y

Everything was very clear except at entrance. No directional sign clearly displayed. Didn't know there was more to exhibit beyond sphere of life. 38-F-Y

Understood everything. Didn't like plows; struck me as odd. 20-M-Y

Didn't like sphere of life--least interesting part. 21-F-Y

Missed seeing the plows--so could have exhibited them more prominently. 19-M-N

Too short--expecting more machinery. Should have shown more technological progress--have been to museum before and expected exhibit to be more typical of Field style--more things to see/play with. (This guy was in wrong museum?) 20-M-Y

Completed High School

Last exhibit a let-down. Not enough information--could have told about more cultures. 65-F-N

Sphere of life didn't come across. Didn't describe what it was trying to say. 42-M-N

Some High School

Would like better description of last piece; the three small sculptures, trinkets from other cultures were disappointing--no description of why they were there. 16-M-N

Sphere of life (too complex); too many planes--confusing. 16-M-N

General Comments:

Ph.D.

Connect last rooms with references to same ideas in other parts of museum would be helpful. Look at weakness of our cultures, not only others. 39-M-Y

As member of museum, receive magazine which is factual; whereas films too preachy for a product of this museum. 73-F-Y

BA

Felt the exhibit dealt with a worn-out subject. 35-F-Y

Very vehement woman. Very angry about space wasted for area of exhibit. Thought films could be shown on small viewing column. Did not like the fact that other exhibits were moved to basement. Thought survey was stupid/disorganized. Waste of money on carpeting. 35-F-Y

Some College

Said exhibit affected her but wasn't yet sure what she might do. ("Sleeper effect") 24-F-N

The subject has seen exhibit several times; brought friends to see it today. 19-F-N